

DEPARTMENT The
Refrigeration
Service Engineer

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JUNE
1948
Vol. 16 No. 6



NOW



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COLDSPOT CHICAGO SEAL

**ASK YOUR WHOLESALER
FOR THIS IMPROVED CHICAGO
COLDSPOT REPLACEMENT SEAL**



**YOUR WHOLESALER
HAS A COMPLETE LINE OF
CHICAGO REPLACEMENT
SEALS AND VALVE PLATES**



**For better
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USE
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VALVE PLATES**

CHICAGO SEAL CO.

**332 S. HOYNE AVE.
CHICAGO 12, ILL.**

THE REFRIGERATION SERVICE ENGINEER, Nickerson & Collins Co., Publishers, 433-435 N. Waller Ave., Chicago 44, Ill. Published monthly, Vol. 16, No. 6, June, 1948. Entered as second-class matter March 4, 1938, Chicago, Ill., under the Act of March 3, 1879. Additional entry at Beloit, Wis., April 15, 1948. Copyright 1948. Subscription in the U. S. \$3.00 per year; other countries \$4.00.

EFFECTS OF MOISTURE IN A REFRIGERATING SYSTEM

Moisture in a refrigerating system may cause any or all of the following:

1. Freezing up at expansion valve or capillary tube, ice in the evaporators.
2. Corrosion of metals to form sludge.
3. Copper Plating.

KNOW *the Corrosion Limits* OF YOUR REFRIGERANT!

RESULTS OF TESTS CONDUCTED ON STEEL

Refrigerant	% Water by Weight	Results
Sulfur Dioxide	0.03	Slight discoloration
	0.10	Slight scale
	0.15	Heavy scale Presence of air did not affect results
Methyl Chloride	0.02	Slight discoloration
	0.03	Marked discoloration
	0.05	Very slight scale Moderate to heavy scale Presence of air increased corrosion in all cases
"Freon-12"		Similar to methyl chloride



SEND FOR THIS BULLETIN

An informative reprint, "MOISTURE AND DRYING METHODS," will be sent on request. No obligation. Send for it today.

ANSUL WHOLESALE-SALERS are ready and equipped to render an intelligent, co-operative service to refrigeration engineers and maintenance men on problems which arise from time-to-time in the operation of refrigerating systems.



*REG U.S. PAT OFF

ANSUL REFRIGERANTS ARE AVAILABLE AT LEADING WHOLESALEERS EVERYWHERE

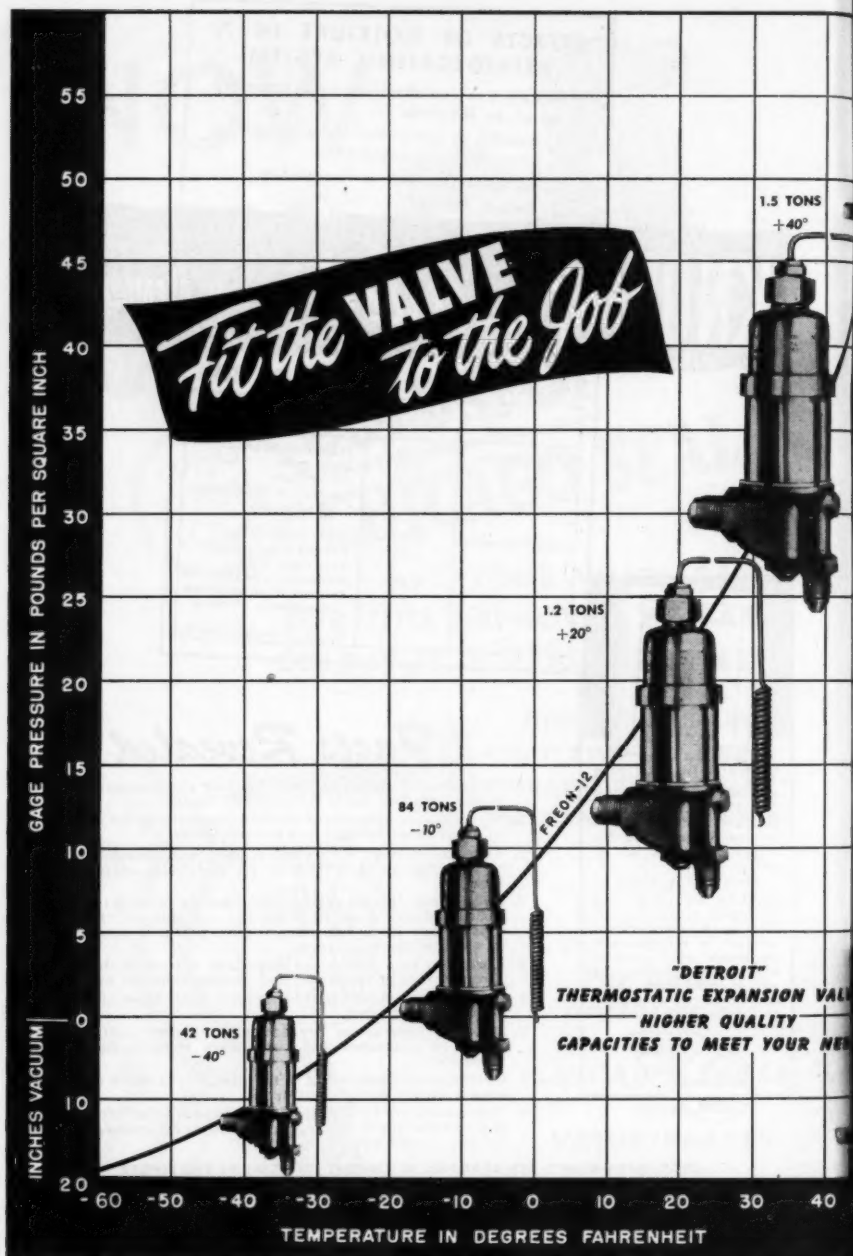
ANSUL CHEMICAL COMPANY

REFRIGERATION DIVISION, MARINETTE, WISCONSIN

DISTRIBUTORS FOR KINETIC'S "FREON 11," "FREON 12," "FREON 21," "FREON 22," "FREON 113" AND "FREON 114"

Facts Revealed

1. Corrosion of metals occurs whenever the amount of water present exceeds fairly well defined limits.
2. Water reacts with sulfur dioxide, methyl chloride, "Freon-12" and other refrigerants to form acids.
3. These acids react with steel, copper, and aluminum parts of a refrigerating system to form definite metallic salts (sludges).
4. In a sulfur dioxide system the amount of moisture tolerable is higher than in a methyl chloride or "Freon-12" system but corrosion, once begun, proceeds more rapidly in a sulfur dioxide system.
5. Corrosion in a butane or isobutane system is due to the direct action of the water and, perhaps, air on metals.
6. Moisture tolerances are higher for copper, brass and aluminum than for steel.
7. Moisture tolerances are lower at higher temperatures found in condenser and compressor than at room temperature.
8. Corrosion is much worse in the presence of air in all refrigerants except sulfur dioxide.
9. Approximately 90% of the sludges produced in refrigerating systems are due to moisture; the others are associated with oil and minor causes.



*Fit the VALVE
to the Job*

1. Capacity depends upon several factors, but largely upon the pressure change developed in the power element by the change in feeler bulb temperature.
2. To flood properly, superheat at the coil outlet should be kept relatively low on all types of installations.
3. Therefore, to insure proper coil outlet superheat, a constant opening superheat is adopted regardless of evaporator temperature. A 3° F. temperature change gives less pressure change and correspondingly less valve opening at lower evaporation temperatures.
4. A constant temperature change, such as 3° F., at the feeler bulb will result in a 3 p.s.i. pressure change at +40° F. evaporation temperature but considerably less than 3 p.s.i. at lower evaporation temperature, such as 1.1 p.s.i. at -20° F. evaporation temperature.
5. Therefore, a valve having 1.5 tons capacity at plus 40° evaporation temperature with a 3° to 4° opening superheat will have a capacity of only .42 tons at minus 40° suction temperature with the same opening superheat.
6. The condensing unit capacity varies in the same manner and in approximately the same ratio as the expansion valve capacity.

Therefore:—Match the nominal expansion valve capacity with the nominal condensing unit capacity and the job will be right for nearly any suction temperature range.

The Same Valve gives you more capacity in tons as evaporator temperature goes up—less capacity as it goes down. Conversely, you need a larger valve to get the same tonnage capacity as evaporator temperature goes down.

5076

DETROIT LUBRICATOR COMPANY



'DETROIT'

DIVISION OF AMERICAN RADIATOR & Standard Sanitary CORPORATION

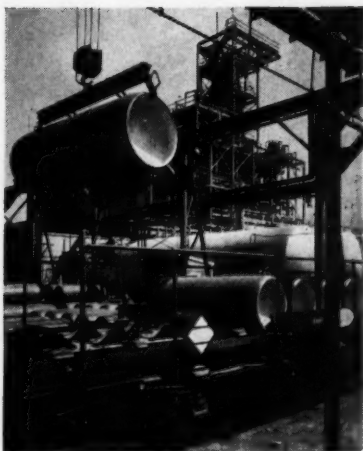
General Offices: 5900 TRUMBULL AVENUE, DETROIT 8, MICHIGAN

"DETROIT" HEATING AND REFRIGERATION CONTROLS • ENGINE SAFETY CONTROLS
FLOAT VALVES AND OIL BURNER ACCESSORIES • "DETROIT" EXPANSION VALVES
AND REFRIGERATION ACCESSORIES • STATIONARY AND LOCOMOTIVE LUBRICATORS

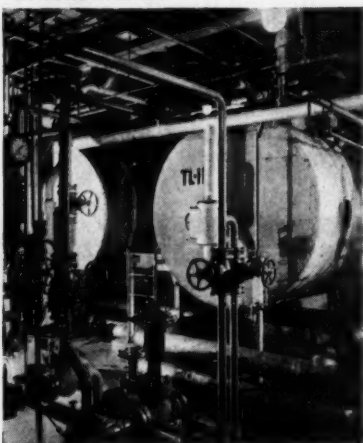
Canadian Representatives—RAILWAY AND ENGINEERING SPECIALTIES LIMITED, MONTREAL, TORONTO, WINNIPEG

Kinetic **ANNOUNCES**

Production Capacity Increased **SIXTY Per Cent**



Ten drums containing first "Freon" from new plant are loaded on flat car.



Tanks, pipes, valves, pumps, gauges—a view of plant interior shows equipment used to produce "Freon."

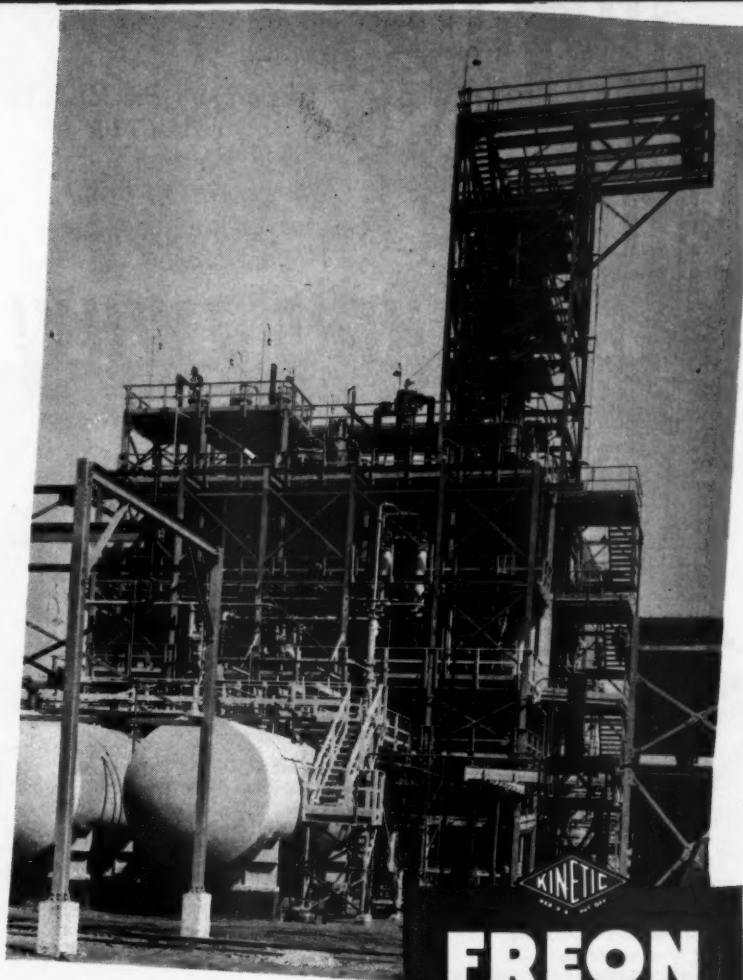
A new, completely modern plant to manufacture "Freon" safe refrigerants and propellents recently began operations at East Chicago, Indiana. Estimates indicate it will increase production capacity of "Freon" sixty per cent.

Construction of the new plant began last August, and a staff of experienced production supervisors aided in speeding the installation of equipment. Production line shipments of "Freon" in ton drums have already started.

Now that ample "Freon" will be available to meet the steadily growing demand for these refrigerants and propellents, it will no longer be necessary to build up individual stock piles. However, the shortage of cylinders in which to ship "Freon" continues, and empty cylinders are still urgently needed to meet current demands.

Kinetic Chemicals, Inc., Tenth and Market Streets, Wilmington 98, Delaware.

New "FREON" Plant



General view of new "Freon" plant housing the highly complicated equipment required in the manufacture of these refrigerants.

FREON

REG. U.S. PAT. OFF.

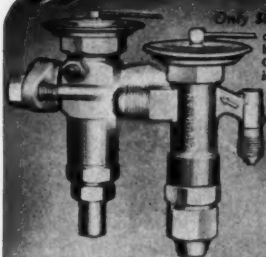
safe refrigerants

"FREON" IS KINETIC'S REGISTERED TRADE MARK FOR ITS FLUORINATED HYDROCARBON REFRIGERANTS AND PROPPELLANTS

DON'T OVERLOOK THIS FACT!

SPORLAN PRODUCTS
are **BETTER**
for both
*Air Conditioning and
Commercial Refrigeration
Installations*

and **HERE is WHY!**



Only **SPORLAN** Thermostatic Expansion Valves can give you Peak Performance on all installations, because only Sporlan offers you **SELECTIVE CHARGES**. Each charge is designed to fit a definite condition.



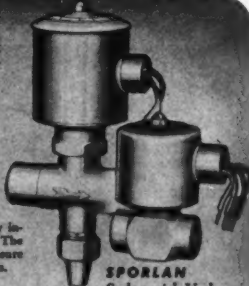
You'll Get Peak Performance on every installation you make with Sporlan Distributors. The perfectly designed nozzle and conical bottom assure even distribution regardless of number of outlets.



SPORLAN Strainers are Peak Performance too, because they are designed better... precision built to closer tolerances, and contain the best materials obtainable.

*Place your next order
with your Sporlan Wholesaler
and get Sporlan throughout.*

You'll see why
Engineers everywhere recommend
PEAK PERFORMANCE
SPORLAN PRODUCTS!

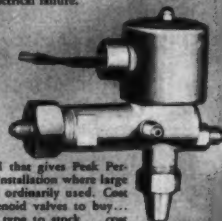


SPORLAN
Solenoid Valves

will give you Peak Performance on all installations too, because the Sporlan Solenoid Coil is so well insulated...so moisture proof, that it defies electrical failure.

Only **SPORLAN** Catch-Alls can give you Peak Performance on all installations, for only the Catch-All has a porous molded cylinder. It cannot pack! It draws the refrigerant to an extremely low end point. A point so low that any remaining moisture is absolutely harmless.

Only **SPORLAN** offers you the Solenoid Pilot Control,



a patented control that gives Peak Performance on every installation where large solenoid valves are ordinarily used. Cost less than large solenoid valves to buy... only one size and type to stock... cost less than large solenoid valves to install.

SPORLAN VALVE CO.

432 BUSEY AVENUE

ST. LOUIS 17, MISSOURI

To Meet Your Refrigeration Needs

"Artic"
REG. U.S. PAT. OFF.

DU PONT METHYL CHLORIDE

99.5% PURE
DRY • UNIFORM

DU PONT METHYL CHLORIDE SPECIFICATIONS

Purity 99.5% Methyl Chloride
Moisture 0.008% by wgt. max.
Acid as (HCl) . . . 0.001% by wgt. max.
Residue on Evaporation 0.01% by wgt. max.
Boiling Range (760mm) 24.6° to 23.8°C.
Color water white, clear

District Sales Offices: Electrochemicals Dept., Baltimore, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, El Monte (Calif.), New York, Philadelphia, Pittsburgh, San Francisco; And Ammonia Dept.: Offices in New York, Philadelphia, Chicago, St. Louis.

HIGH PURITY! Du Pont Methyl Chloride will meet your refrigeration requirements.

ORDER WHAT YOU NEED—NOW! It's available from wholesalers' stocks in principal cities.

YOU'LL WANT THIS NEW BOOK— 72 pages of practical information for Refrigeration Engineers. Physical, chemical, physiological and refrigerating data . . . complete tables of thermodynamic properties . . . engineering information . . . handling and servicing methods. **FOR A FREE COPY, WRITE:** E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Wilmington 98, Del.



Tune in Du Pont "Cavalcade of America" Monday nights—NBC coast to coast



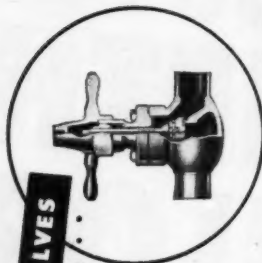
BETTER THINGS FOR BETTER LIVING
THROUGH CHEMISTRY

**DU PONT
ELECTROCHEMICALS**

C

ustomer goodwill, your most priceless asset, is always enhanced when you specify and use a Henry Product.

WING CAP VALVES



Equipped with patented, self-aligning stem disc which does not rotate on seat. Resilient packing. Valves are back seating and can be repacked under pressure. Inverted wing cap operates valve. Unrestricted flow. Bronze alloy bodies. $\frac{3}{8}$ " to $4\frac{1}{2}$ " O.D.S. Semi-steel bodies with adapters for soldering or brazing to copper pipe — $1\frac{1}{4}$ " to $5\frac{1}{2}$ " O.D.S.



Sold by leading wholesalers

HENRY VALVE COMPANY

Control Devices, Valves, Driers, Strainers and Accessories for Refrigeration and Air Conditioning and Industrial Applications.

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That's Right!

Kelvinator parts are priced right...
always right for the job!

You're right from every angle—when you buy dependable refrigeration parts . . . from Kelvinator!

Each item is *quality-built* for peak performance—*competitively priced* to fit right into your sales picture. And you can choose from a *complete stock* of the finest refrigeration parts at any of the 50 Kelvinator depots.

For fast, friendly, Kelvinator service . . . mail or phone in your order . . . or stop by in person . . . Kelvinator, Division of Nash-Kelvinator Corporation, Detroit, Michigan.



GET YOUR COPY! Here's a new catalogue for the *quick, easy* way to buy refrigeration parts and supplies. All information and prices are grouped for easy reference. Ask for it at your local Kelvinator Distributor's or Zone Office.

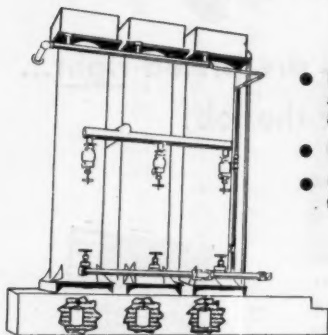
Kelvinator

CONDENSING UNITS
REFRIGERATION PARTS AND
SUPPLIES



BUY KELVINATOR FOR ALL YOUR REFRIGERATION REQUIREMENTS

The CSCO AQUATROL System A Simple But Very Efficient Device Designed To **DESTROY ALGAE**



- Helps to Prevent Further Accumulation of **ALGAE, SLIME, SCALE** and **ENCRUSTING MATTER** on Heat Exchange Surfaces
- Helps to Increase Volume of Production
- Helps to Decrease Percentage of Production Cost

In Air-Conditioning Systems, Cooling Towers, Spray Ponds, Cooling Water Circulation Systems, Air-Wash Systems, Barometric Condensers, Cooling sides of Evaporating Condensers, Ice Plants, Vertical Condensers, All Heat-Exchange

Systems, Cleaning Roots out of Pipe Lines.

AQUATROL consists of chemicals in a container which is to be placed in those parts of your cooling system affected by **ALGAE, SLIME, SCALE AND ENCRUSTING MATTER**. Water flowing through the container is treated with chemicals which are so perfectly balanced they convert the above mentioned destructive forces into precipitates which collect in the bottom of the cooling system and are easily removed. The flow of this chemically treated water may be regulated to avoid unnecessary waste.

CSCO AQUATROL eliminates the daily dosing of water with compounds . . . and needs no further attention other than to place new tablets in the device as needed. **SAVES TIME! SAVES MONEY! SAVES LABOR!** Protects and prolongs the life of equipment and helps the equipment give more efficient service!

AQUATROL Outfit for small operation, \$15 f.o.b. Birmingham.

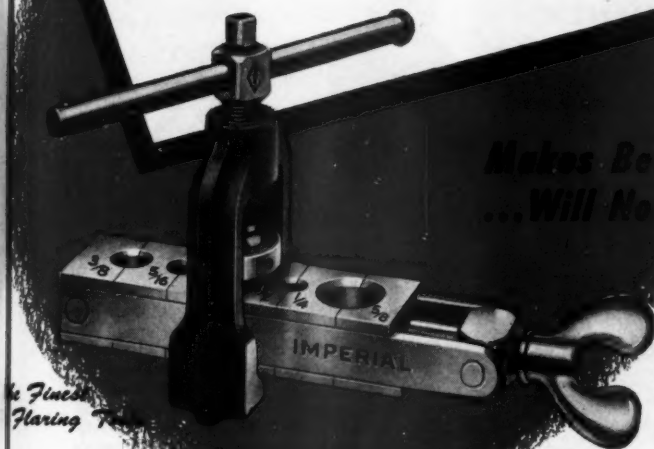
For larger operations, \$25 f.o.b., Birmingham

CHEMICAL SOLVENT COMPANY

3005—16th Street North

Birmingham, Ala.

New IMPERIAL Hi-Duty FLARING TOOL

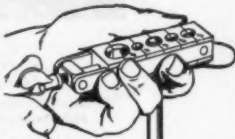


*Makes Better Flares Faster
...Will Not Score the Tubing*

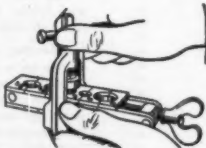
HAS NEW DIE HOLDER WITH SLIDING DIES



1. Simply insert tubing between segments of the proper size die block.



2. Swing cam action clamp into position against end die and tighten thumb screw.



3. Slide yoke over end of die holder into position over tubing to be flared, and turn compressor cone down firmly. The result is a precision 45° flare without scoring the tubing

SPEEDY, SINGLE END CLAMPING

Here is an important new advance in flaring tools... a new tool that makes precision S.A.E. flares faster and easier—and makes them without scoring the tubing. Flares the most popular sizes of soft copper, brass and aluminum tubing.

In place of the usual bar it has a die holder with sliding dies for clamping the tubing. Only one thumb screw to tighten—a ball thrust bearing makes it easy to turn.

The extra depth, smooth surface dies hold the tubing tightly without scoring. Freedom from scoring is considered by many engineers to be an important advantage in making longer lasting flare joints.

Yoke is made of forged steel; steel dies are heat treated. Tool is extra strong and durable. See your jobber for full information on this fast working tool and others in the complete Imperial Tubing Tool Line. Ask for Folder 347.



SMOOTH
GRIP
WILL
NOT
SCORE
THE
TUBING

No. 300-F Imperial Hi-Duty Flaring Tool. Flares 1/4", 5/16", 3/8", 1/2" and 5/8" O.D. Tubing. Each.....\$5.20

THE IMPERIAL BRASS MFG. CO., 534 S. Racine Avenue, Chicago, Illinois

IMPERIAL

*See
Your
Jobber*

Fittings • Valves • Filters • Driers • Floats • Charging Lines
Tools for Cutting, Flaring, Bending, Pinch-off and Swedging

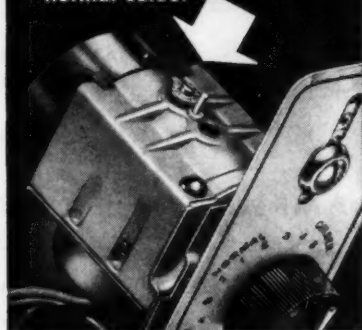
FILLING ALL NEEDS

The Cutler-Hammer Line of REFRIGERATION REPLACEMENT CONTROL

This One Universal unit
alone covers 60% of
all needs.



4 degree external differential
adjustment either side of
normal cutout



Bul.
9521N9

Adjustable Mounting Brackets

Maximum Mounting Centers..... 4-3/16
Minimum Mounting Centers..... 2-3/16

Adjustable Cutout Feature—Differential
can be increased 4 degrees by turning indi-
cator in "Hi" direction and decreased 4 de-
grees by turning in "Lo" direction.

Adjustable Range—Turning screw clock-
wise lowers settings and counter-clockwise
raises settings.

Operating knob can be adjusted to meet
various evaporator scale settings. New knob
is ideal for varying shield thicknesses. Makes
this control adaptable to wider range of
single dial replacement jobs where overload
is not required in unit.

The Cutler-Hammer line of Refrigeration
Replacement Control will meet all the re-
frigeration serviceman's requirements. One
Cutler-Hammer Control Unit alone... the
Universal Replacement unit... will handle
60% of his needs. And where exact replace-
ment control is needed, that item also will
be found in the C-H Exact Replacement
Control line... individually packed, clearly
labelled, complete with dial plate, mounting
screws, trim washers and full instructions
for mounting and adjustment.

Behind this line are 50 years of control
specialization and thorough knowledge of
merchandising requirements. Thus, the line
is recommended by outstanding refriger-
ation wholesalers from coast to coast and
alert service organizations everywhere use
it to reduce investment in stock, to insure
regular and rapid turnover, faster comple-
tion of the job, and greater all-round satis-
faction. CUTLER-HAMMER, Inc., 1363
St. Paul Ave., Milwaukee 1, Wisconsin.



DOMESTIC, SEMI-COMMERCIAL AND COMMERCIAL CONTROL

FRIGIDAIRE MODULEX THERMOSTATIC EXPANSION VALVES

Precision-built for dependable and accurate operation. Warranted for one year. Now in plentiful supply.

Frigidaire Modulux valves set a new high standard for efficient temperature control. Because they are super-sensitive to changing load conditions and permit operation of cooling units at the most efficient suction pressures. More, these valves give the serviceman complete flexibility on the job. For they may be installed in any position inside or outside of the fixture. Modulux valves are available in 17 models, ranging in capacity from 3,000 to 48,000 Btu per hour.

Nine More Reasons Why Leading Servicemen Prefer Frigidaire Modulux Valves

1. Compact, light-weight construction.
2. Non-porous, forged brass body.
3. Single bellows, hermetically sealed.
4. Gas-charged feeler bulb assures precise control.
5. Removable fine-mesh strainer on inlet side.
6. Self-aligning, stainless steel needle.
7. Non-corrosive valve seat. Needle and seat replaceable.
8. Especially recommended where automatic defrosting is desired.
9. Thoroughly factory-tested, accurately calibrated.



Frigidaire Makes a Quality Valve for Every Refrigeration Need

Where constant refrigerant pressure is required, Frigidaire Automatic Expansion Valves are recommended. They incorporate many of the design features and advantages of Modulux Valves. Other Frigidaire Valves include High-Capacity Expansion Valves, Cooling Unit Regulating Valves and Crankcase Pressure Regulating Valves.

FRIGIDAIRE "PARTS" CATALOG

Free to all
refrigeration servicemen



Frigidaire service parts, now in plentiful supply, are available to all refrigeration servicemen. For your free Frigidaire "Parts" Catalog, write to: Frigidaire Division, General Motors Corporation, 1262 Amelia Street, Dayton 1, Ohio.

You're twice as sure with two great names

FRIGIDAIRE
made only by
GENERAL MOTORS

FRIGIDAIRE DIVISION
General Motors Corporation,
1262 Amelia St., Dayton 1, O.

Please rush my free copy of your new parts catalog—"Genuine Precision-Built Frigidaire Parts and Accessories."

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BACK AGAIN



HEAVY DUTY BEER COOLERS

by Temprite

Out of production since before the war, Temprite heavy duty beer coolers are back again to help you make more money. Now is the time! This is the season! Tell your customers

about Temprite. You can now offer 7 new improved models for every type of beer cooling application. Outstanding features include specially shaped stainless steel coils, compact size and patented temperature control.

Write or wire now for details.

TEMPRITE PRODUCTS CORP.

Originators of Instantaneous



Liquid Cooling Devices

45 PIQUETTE AVENUE

DETROIT 2, MICHIGAN

Copeland

DEPENDABLE *Electric* REFRIGERATION

Gets the Ring

Say "Copeland" to a refrigeration unit prospect, and it's like mentioning a class automobile to a car owner. Copeland stands for effective, trouble-free performance under all conditions. That's why it's easy for you to get in with your story, out with the order. Your market is already lined up — all around the town. The Copeland line means more signing on the dotted line.



Manufacturers of: Refrigeration Units (open-type and Copelametic), Water Coolers, Refrigerators.

COPELAND REFRIGERATION CORPORATION, SIDNEY, OHIO

SERVICE ENGINEER

16.

June, 1948

Takes No Storage Space

FROM
A
COOLER



MOUNTS
AGAINST
CEILING
NEXT TO
WALL

Filterpure

HALF ROUND CEILING UNIT

For Walk-ins and Florist Boxes.

Installed on the ceiling adjacent to wall, completely out of the way. Cooler is blanketed with low velocity air, with a relative humidity in excess of 85% thru a 180° arc. Equipped with Air Purification—Built-in Louvres—Built-in Liquid Distributor—Slide Hangers. Made in 6 popular sizes from 260 to 867 BTU per 1° TD. Highly efficient, compact, streamlined.

Sold by Leading Refrigeration Wholesalers

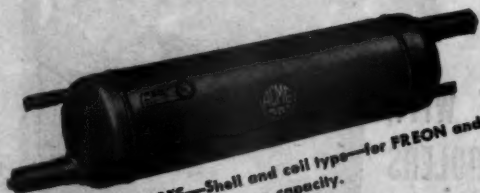
BETZ CORPORATION
HAMMOND • INDIANA



Your Jobber

CAN SUPPLY YOU WITH

These GENUINE Acme products

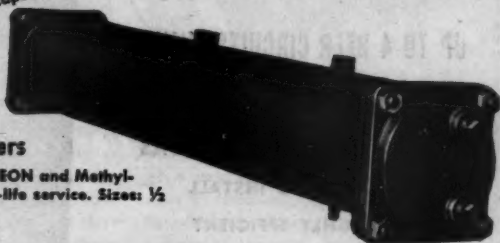


Heat Exchangers—Shell and coil type—for FREON and Methyl-Chloride— $\frac{1}{2}$ to 50 ton capacity.



Freon OIL SEPARATORS

Double filter for double efficiency. Moderate cost. Six models— $\frac{1}{4}$ H.P. to 10 H.P.



Shell and Tube Condensers

Low-cost, easy to clean. For FREON and Methyl-Chloride. Sturdily built for long-life service. Sizes: $\frac{1}{2}$ to 25 tons capacity.



Shell and Coil Condensers

Efficient yet inexpensive. Extremely popular for replacement. For FREON and Methyl-Chloride. Sizes: $\frac{1}{2}$ to 5 H.P.

Continuously serving the Refrigeration Industry since 1919... there is a wealth of practical experience back of these Acme products... now available through jobbers.

ACME INDUSTRIES, INC.

JACKSON, MICHIGAN

HEAT-X-CHANGER BEER COOLERS



**MODELS FOR USE WITH
OR WITHOUT PRE-COOLERS**

UP TO 4 BEER CIRCUITS AVAILABLE

NO FREEZE-UP DAMAGE

STAINLESS STEEL BEER COILS

SIMPLE TO INSTALL

HIGHLY EFFICIENT



**SEPARATE BEER, WATER AND REFRIGERANT COILS CAST IN AN
ALUMINUM BLOCK**

● No accessories such as surge drums, oil separators etc., are needed. No chance for beer to lose its carbonation, or to become contaminated.

The aluminum block provides cleanliness, sanitation, and exchange of heat between copper water coil, stainless steel beer coils and copper refrigerant coil. Coils cannot expand and become damaged in event of freezing.

THE HEAT-X-CHANGER CO., INC.
415 Lexington Avenue, New York 17, N.Y. Brewster, N.Y.

BRUNNER
SINCE 1906

REFRIGERATION helps you serve better

Memo to Maintenance Engineers

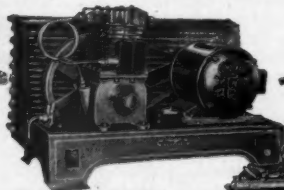
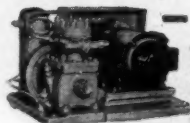
15% = 100%



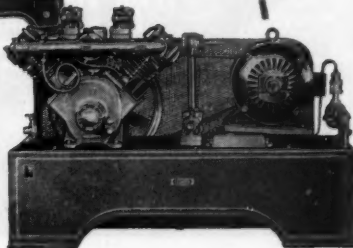
Tain't so you say, but consider this: often less than 15% of the installed cost of a refrigerated display case, walk in cooler or similar refrigerated equipment is represented by the actual refrigeration unit. Now think: the entire usefulness of that equipment and the value of their contents is *fully dependent* upon the uninterrupted operation of the refrigeration unit.

Your customers realize this. That's why they look to you, on both new and replacement installations, to provide refrigeration units that will give full usefulness and protection to their refrigeration dollars. Satisfied customers are your best source of income—protect it—install Brunner.

BRUNNER MANUFACTURING CO.
Utica 1, New York, U. S. A.



AIR AND WATER COOLED MODELS
1/4 HP. TO 25 HP.



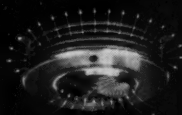
NEW **DOME** COOLER

ONE OF THE BIG THREE OF 1948



Two-way Dome Cooler with air flow limited to two directions

Model No.	List Price	Capacity
		BTU per Hr. 1° T.D.
67	\$ 59.15	65
97	70.50	95
127	80.50	125
227	111.45	225
327	143.00	325
457	196.00	450
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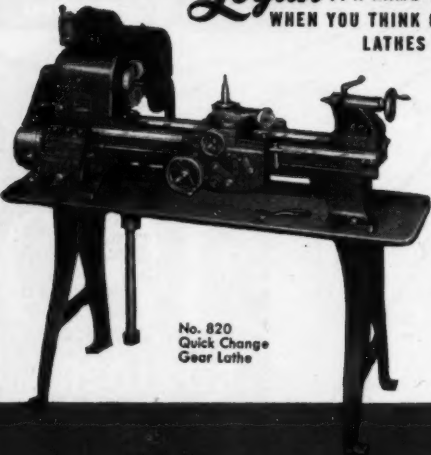
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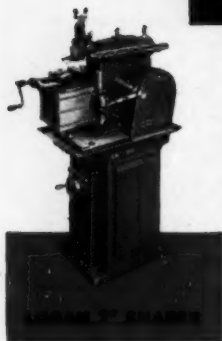
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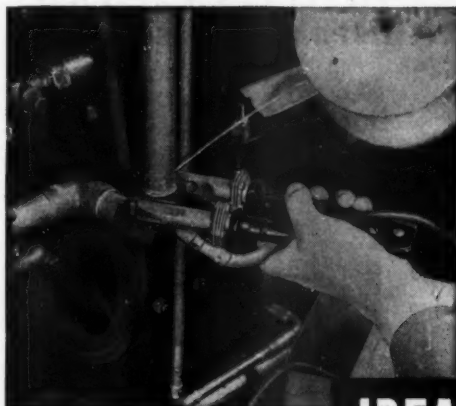
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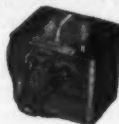
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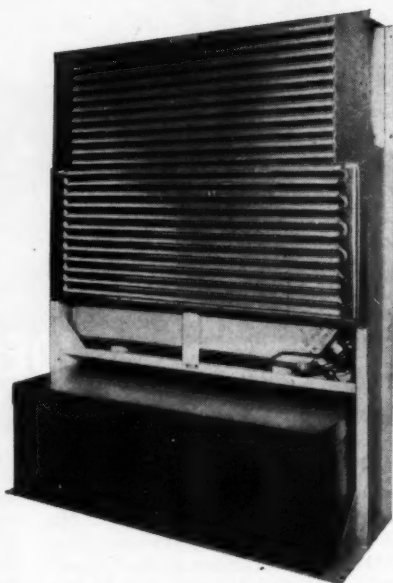


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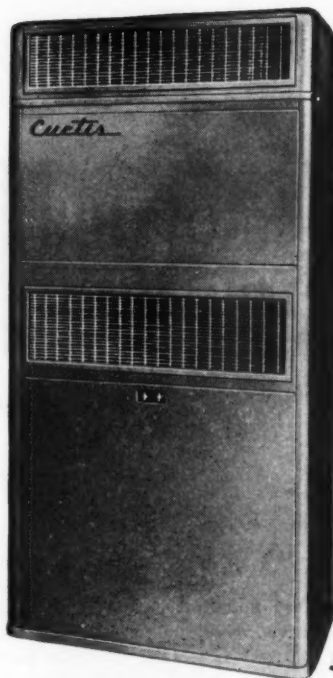
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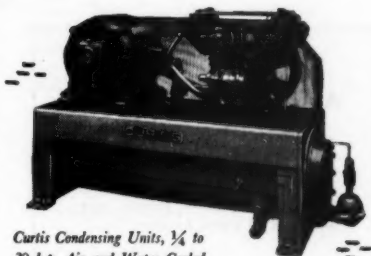


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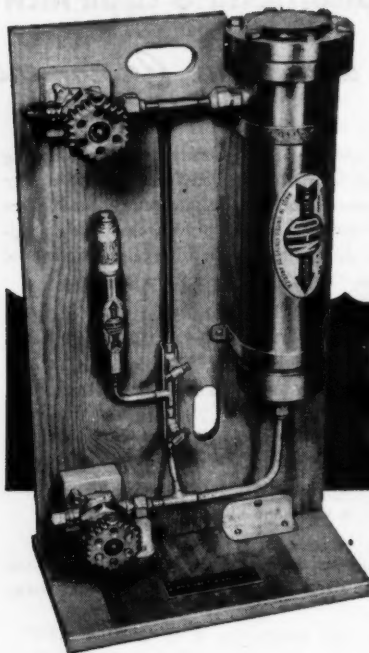
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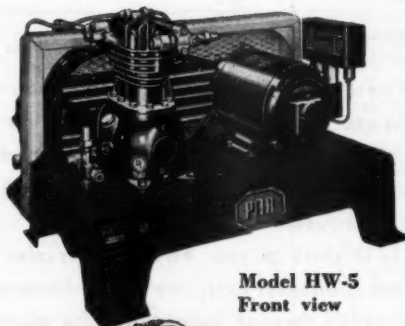
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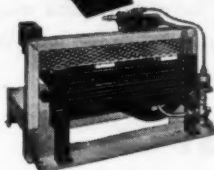


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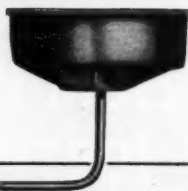
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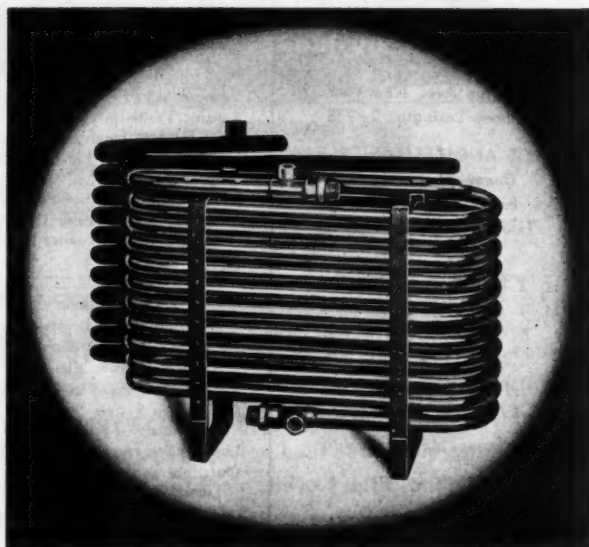
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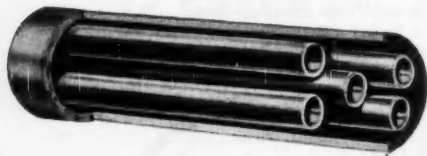
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IN THIS



ISSUE

THERE is more to a solenoid valve than meets the eye, and the fellow who may be called upon to select the right type of solenoid to perform the job he wants it to do will need to know the difference between types. A liberal knowledge of those types used in refrigeration is contained in the article "Solenoid Valves" by H. F. Spoehrer, on page 33.

THE trade-in problem is on its way back after a number of years' absence and it is probable that the average age of the trade-in of today will be much greater than before the war. According to the advice of one firm, contained on page 41, dealers will have much less trouble making profitable sales of these trade-ins if they are all repainted.

IT REALLY is quite simple if you use the suggestions of D. D. Wile in figuring your air conditioning problems. In his article "Simplifying Your Air Conditioning Problems" appearing on page 42, Mr. Wile has reduced much of the calculation to a simple matter of factor selection, thus eliminating some of the tedious calculation.

K. M. NEWCUM presents on page 51, a somewhat different idea on the proper location of driers for maximum results. In his article "Solving Your Moisture Problems" he also discusses at some length the construction and arrangement of drier-filters. As usual when the subject of moisture is brought up, it is a very interesting discussion.

VEGETABLES packed in a bed of ice not only keep in better condition but apparently have greater appeal to the purchaser. It takes plenty of ice, though, and that is where the ribbon ice machine serves its purpose. The article

on page 57 tells how one market is increasing vegetable sales by making its own ice and using plenty of it.

SERVICE Pointers this month, appearing on page 58, contain several helpful suggestions on repair methods in addition to the method of calculating the current consumption of motors.

THE Question and Answer section of this issue, page 63, contains more of the questions discussed at the annual RSES convention.

THE penetration of frost through the floor of a freezing room into the ground on which it rests can cause the total destruction of floors and walls of the freezer through frost heavage. A simple method of avoiding such damage is given in the article appearing on page 72.

THE farm market for the next five years looks very good for the refrigeration field, according to a report appearing on page 78.

COVER

FOR the past several years the Mile High Chapter of The Refrigeration Service Engineers Society has made an annual event of its tube bending contest, inviting the best skills among its members to compete for the prizes offered. Each year the projects become more difficult and each year the craftsmanship of the contenders improves in proportion. This year the contestants shown on our front cover worked in pairs and the project involved soft and hard soldering in addition to tube bending. Other pictures of the event and the story appear in the Society section of this issue.



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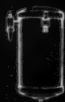


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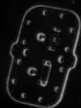
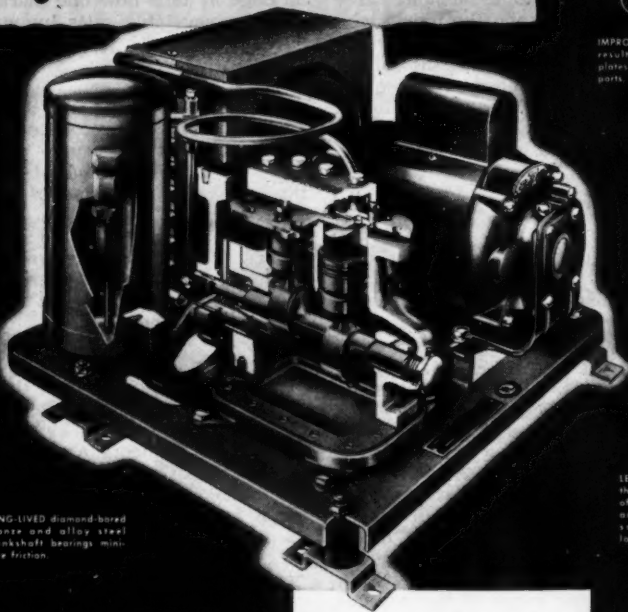
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Solenoid Valves

Their Design, Operation and Application to the Refrigerating System

By H. F. SPOEHRER *

BEFORE getting into a discussion of the operation, application and servicing of solenoid valves, I'd like to review very briefly a few fundamental points relating to electro-magnets. It is not my intention to delve deeply into the theories of magnetism but merely to point out a few things which will have a bearing on some of the discussion to follow on solenoid valves.

If current is passed through a single conductor as in Fig. 1, a magnetic field will be set up around the conductor. This field consists of many so-called lines of magnetic force. If a current is passed through a coil of wire as in Fig. 2, or solenoid then there will be many more lines of magnetic force. The strength of this magnetic field depends upon the physical characteristics of the coil as well as on the applied voltage and many other factors. This magnetic field has a pulling power similar to that which exists in the ordinary horseshoe magnet. The difference, of course, is that in a horseshoe magnet the iron is perma-

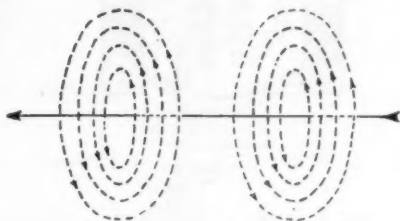
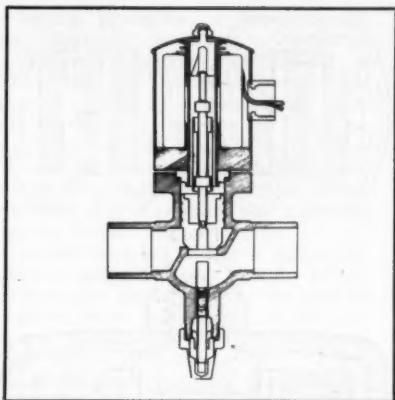


FIG. 1

nently magnetized, whereas in the case of a solenoid coil the magnetic field exists only when the current is flowing through the coil.

If a piece of magnetic metal, such as iron, is introduced into the magnetic

* Vice-President, Sporlan Valve Co., St. Louis, Mo. Paper delivered before RSES California Association meeting in San Francisco.



field it will be pulled into the coil, as indicated in Fig. 3. The magnetic field is strongest in the center of the coil and, therefore, the plunger will tend to center itself inside the coil.

The reluctivity or resistance to the passage of the magnetic lines of force is considerably less in iron than it is in air. Therefore, a better electro-magnet can be made by providing a complete

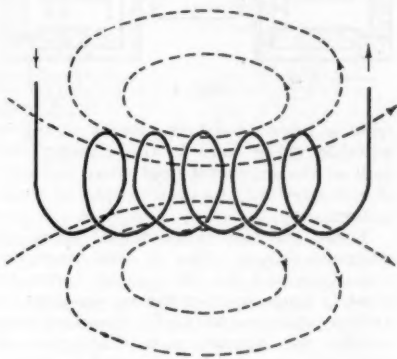


FIG. 2

magnetic circuit of iron or steel around the coil. A stronger magnetic field can be established with less wattage by use of a complete magnetic circuit of metal. Fig. 4 shows the usual construction providing for a complete metallic magnetic circuit.

There are many uses for electro-magnets. The one we are concerned about

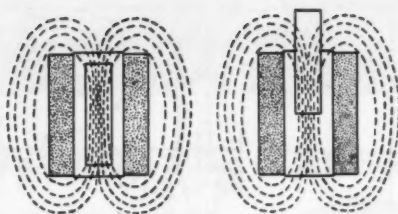


FIG. 3

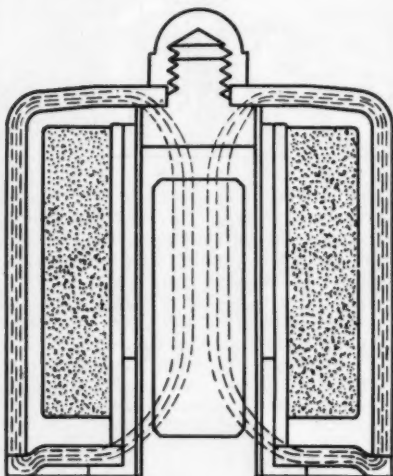


FIG. 4

here is solenoid valves. By attaching a suitable valve stem to the plunger the pull of the magnetic field when the coil is energized may be used to open or close valves.

There are two fundamental types of solenoid valves. One is the normally open type and the other is the normally closed. Since most of the valves used in refrigeration are normally closed we will confine our discussion to that type. A normally closed solenoid valve is one in which the valve opens only when the electric coil is energized, and which closes by gravity when the circuit is broken to the coil. Solenoid valves may be further classified into direct acting and auxiliary or pilot operated types, and also into types in which the plunger makes solid contact with a pole piece or plug at the top end of the enclosing tube and those in which the plunger floats. Fig. 5 shows a solenoid valve

which is direct acting. That means that the plunger opens the main port of the valve directly. This valve is designed so that the plunger makes solid contact against the pole piece in the end of the enclosing tube. Some plungers and pole pieces are flat. This one has a conical surface on the plunger and a corresponding conical depression in the pole piece. This design tends to increase the steady pull of the magnet. Where the plunger makes solid contact with the pole piece it is usually necessary to provide a kick off spring, as shown here, because sometimes residual magnetism remains in the plunger and pole piece and the plunger does not drop down when the coil is de-energized. Frequently a small copper ring or shading band is placed in the top end of the plunger or in the pole piece to prevent residual magnetism.

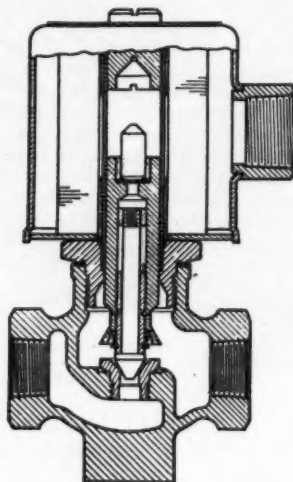


FIG. 5

Fig. 6 shows a valve with a floating plunger. The plunger merely floats inside the coil and does not make solid contact with the pole piece. You will notice that most direct acting valves are designed with a hammer blow effect. The plunger starts upward before the valve stem. The plunger then picks up the stem by making contact with the nut or collar at the top of the valve stem. The momentum of the plunger assists in opening the valve against any

unbalanced pressure which is present across the valve's orifice.

Direct acting valves are limited to small sizes. Usually direct acting valves are not made with ports larger than

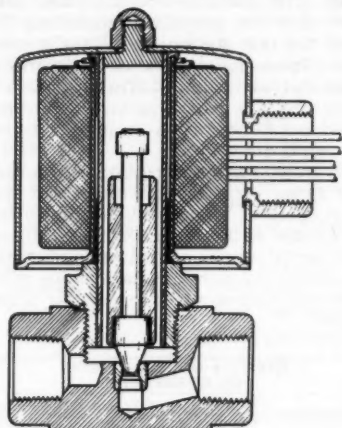


FIG. 6

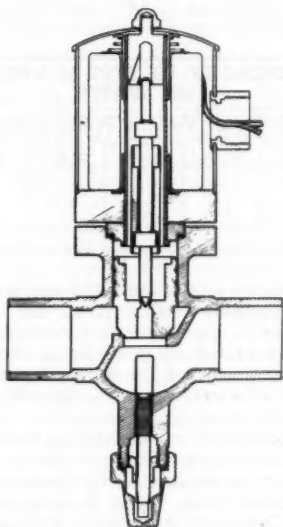


FIG. 7

about $3/16"$ to $1/4"$. Larger direct acting valves could be built but the magnetic structure would become too large, too heavy and too expensive.

In order to make valves economically

for larger capacities or exceptionally high operating pressure a different mechanism is employed. Fig. 7 shows the construction of a so-called piston type valve or auxiliary operated or pilot operated valve. In a valve of this type the plunger merely opens a small pilot port and the main valve is lifted off of the seat by pressure of the fluid being controlled. Fig. 8 explains just how this is accomplished.

The first drawing in Fig. 8 shows the pilot port and main port closed. Whatever pressure exists on the inlet side of the valve exists both on top of the piston and underneath the piston. Some valves actually have a hole drilled through the piston to permit the pressure to equalize on both sides of the piston.

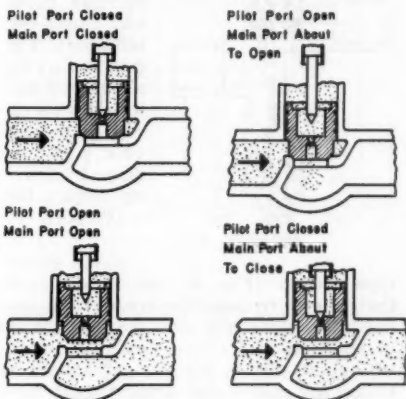


FIG. 8

When the electrical coil is energized the plunger lifts and opens the pilot port. The pilot port must be of such size that its area is greater than the clearance area between the piston and valve body plus the area of a leak hole through the piston if one is used. Then when the pilot valve is open the pressure above the piston becomes lower than the pressure under the piston because the pressure is dissipated through the pilot port quicker than it can be built up by leakage around the piston. This differential pressure across the piston acting upon the area of the piston lifts the main valve off of the seat. In some of these valves there is no mechanical connection between the pilot stem and the plunger. Once the piston is off of the

main valve seat it floats because of a small pressure differential which exists across the piston. If the flow of fluid through the valve increases or decreases the piston will float higher or lower in

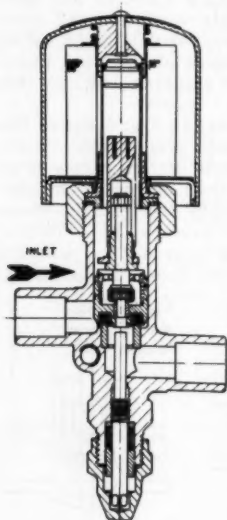


FIG. 9

Some piston type valves (Fig. 9) are so designed that there is positive connection between the pilot stem and the piston and, in addition to the pressure differential lifting the piston, the plunger assists in lifting the piston and supporting it during the entire time the valve is open.

The advantage of this type is that on applications where there is no pressure drop across the valve available for floating the piston the valve will stay open. Such a condition is sometimes encountered where the solenoid valve is used in a by-pass across a flooded evaporator. The disadvantage is that if the piston sticks because of dirt or congealed oil the coil may burn out because the plunger may be prevented from pulling in all the way. The advantage of the floating piston type is that the coil will not burn out if the piston sticks because the plunger can still pull in, but the disadvantage is that on some few applications where there is no pressure drop across the valve the valve will not open.

There are other types of solenoid valves in which a diaphragm is used to

operate the main valve and where the solenoid merely opens a small pilot port. There are also some exceptionally large valves in which there is a series of two or three pistons of increasing sizes. The solenoid opens a small pilot port and the pistons successively lift until the last one opens the main valve port. Space doesn't permit of describing these valves in detail. The ones I have described are most commonly encountered on refrigeration or air conditioning applications.

So much for a description of the various types of solenoid valves and how they operate. I should like now to discuss some of the factors which influence the performance of valves and which should be taken into consideration when selecting valves for a particular application.

CAPACITY OF TYPE 12 VALVE ON REFRIGERANTS					
Refrigerant	Tons Refrig. at Various Pressure Drops				
	1 lb.	2 lb.	3 lb.	4 lb.	5 lb.
Freon-12	1.9	3.0	3.4	3.8	4.2
Methyl Chloride	3.8	6.0	6.8	7.6	8.4
Sulfur Dioxide					

CAPACITY OF TYPE 12 VALVE ON WATER				
G. P. M. at Various Pressure Drops				
2 lb.	4 lb.	6 lb.	8 lb.	10 lb.
1.0	1.3	1.5	1.7	1.9

FIG. 10

Solenoid valves are rated at some certain pressure drop across the valve. Usually on valves for refrigerants 2 lbs. psi pressure drop is taken as standard. The tables in Fig. 10 show how the capacity of a valve varies as the allowable pressure drop varies.

All solenoid valves have a maximum pressure rating, which is always indicated in solenoid valve catalogs and also on name plates. This is an important point in selecting a valve. This operating pressure not only means that the parts will stand such a pressure, but of greater importance is that this figure is intended to represent the maximum pressure against which the valve can be opened. To illustrate, suppose we consider a valve with a $\frac{1}{4}$ " port as in

Fig. 11. The area of the port is .012 sq. in. If the line pressure is 100 lbs. psi and the pressure on the low side of the valve is 0 lbs. then the pull which must be exerted on the valve stem to overcome the unbalanced pressure is $100 \times .012$ or 1.2 lbs. If we consider a valve with a $3/16"$ port where the port area is .028 sq. in. then we would need a pull of $100 \times .028$ or 2.8 lbs. in order to open

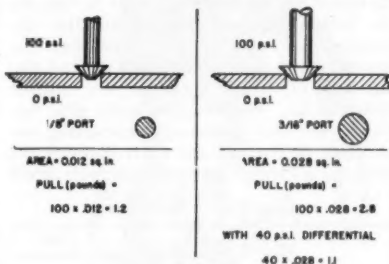


FIG. 11

the valve. If we have a pull available of only about 1 lb., as we had in the first case, then we would have to reduce the maximum operating pressure rating of the valve to about 40 lbs. psi so that when we multiply 40 lbs. \times .028 sq. in. the pull required is only 1.1 lbs. Therefore, as we increase the port size of a valve we must either reduce the maximum operating pressure rating or use a larger magnetic structure to open the valve against the high pressure difference.

All valves are rated at a certain voltage. The pull, and consequently the main operating pressure rating, vary as the voltage varies. The curve in Fig. 12 shows the variation in main operating pressure for one particular valve as the voltage varies. Usually valves are designed to operate successfully on a voltage variation of 10 percent above or below the normal voltage rating. However, if the voltage varies more than that from standard then difficulties are apt to be encountered. If the voltage drops lower than 10 percent below rated voltage the pull may drop so low that the valve may not open against rated operating pressure. If the voltage is higher than 10 percent above rated voltage there is a possibility that the coil might burn out from overheating.

The solenoid coils may be random wound or they may be layer wound.

Some layer wound coils have cotton or paper insulation between layers while others do not. Some coils may be wound on a temporary mandrel or may be wound on a permanent bakelite or plastic spool or tube. All coils used on re-

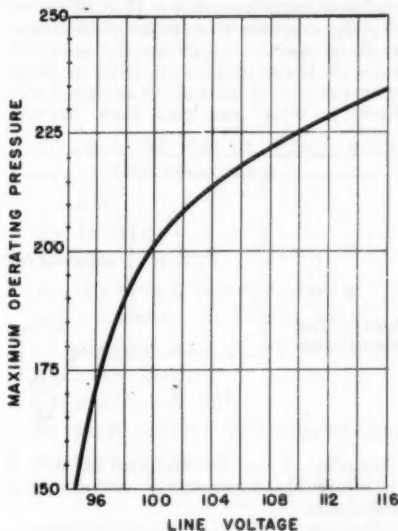


FIG. 12

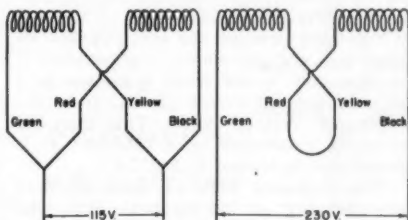


FIG. 13

frigeration are usually dipped in waterproof varnish and are baked in an oven. Single voltage coils are made with one continuous winding, but dual voltage coils are actually made with two separate windings. Two leads are brought out from each winding or each half of the coil and by connecting the four leads as shown in Fig. 13 the dual voltage coil can be used on say 115 volts or 230 volts. When the coils are connected in parallel the valve will operate on 115 volts, and if they are connected in series the valve will operate on 230 volts. It is extremely

important to connect the coils as indicated. If the connections are reversed so that the two coils are opposing each other they will burn out. Coils can be designed that will operate on dual frequencies. That merely means that if a coil is to operate on either 50 or 60 cycles it is designed for an average of 55 cycles. If it is used on 50 cycles the coil will have a little more pull than normal, whereas if it is used on 60 cycles it will have a little less pull than normal.

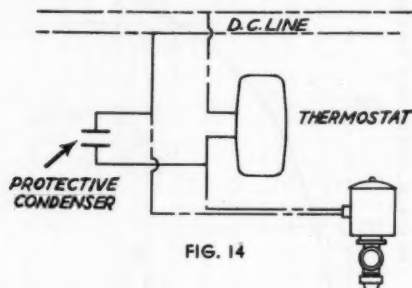


FIG. 14

However, it can be designed so that it will operate successfully under either condition.

Because of the fact that direct current coils have such a large number of turns of wire when the circuit is broken a high counter voltage is developed in the coil which may damage the coil. To absorb this high voltage which is generated, it is necessary to use what is known as a surge protector across all DC coils except low voltage coils. This may be either a condenser or a resistor. It is connected as shown in Fig. 14.

The magnetic field or lines of force are spoken of as the magnetic flux. The magnitude of the flux determines the ultimate pulling ability of the solenoid. The formula for flux is shown in Fig. 15.

$$\Phi = \frac{10^8 E}{4.44 f N} = \frac{E}{f N} C$$

FIG. 15

In this formula, E is the voltage f is the frequency N is the number of turns of wire and C is the constant. It may readily be seen from this formula that for any given valve with a certain lifting

job to do, which is fixed by the port size and maximum operating pressure, the number of turns of wire required in the coil vary directly with the voltage. The higher the voltage on the coil the more turns of wire there are required. As far as frequency is concerned, the higher the frequency the less turns that are required and, conversely, the lower the frequency the more turns are required. To maintain the same wattage in the coil the higher the voltage the smaller the current will be and, therefore, the smaller the wire need be. So, as the number of turns increase for higher voltages the smaller the wire size becomes so that generally speaking regardless of the voltage or frequency the coils for a given valve are approximately

SOLENOID COIL SPECIFICATIONS

Coil Rating	Total Turns	Wire Size Number	*Area Circular Mils.
115V.-25C.	7200	32	64.00
115V.-50C.	3600	29	127.70
115V.-60C.	3000	28	158.80
230V.-25C.	14,400	35	31.36
230V.-50C.	7200	32	64.00
230V.-60C.	6000	31	79.21

*Area of wire having diameter of .001"

FIG. 16

the same physical size. Fig. 16 shows how the number of turns and wire size vary for different voltage and frequency ratings. A 115 volt-25 cycle coil has twice as many turns as a 115 volt-50 cycle coil, but the wire size is about half as large. A 230 volt coil has twice as many turns as a 115 volt coil, but the wire size is about half as large. This means that since the number of turns increases when the voltage increases and the number of turns decrease when the frequency increases a 115 volt-25 cycle coil has exactly the same number of turns and the same wire size as a 230 volt-50 cycle coil.

Many valves are equipped with a manual opening stem. Fig. 17 shows a valve so equipped. The purpose of this stem is to open the valve manually in case the coil is burned out or the circuit to the coil is not in operation. As this stem is screwed in it merely pushes the valve off its seat. Normally the stem is backed out far enough so that the valve

can seat without interference from the manual stem.

Solenoid valves may be actuated by any two wire control device which opens and closes an electric circuit. It may be

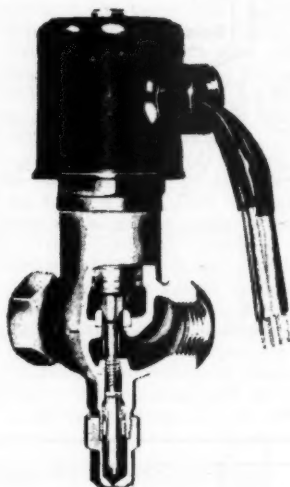


FIG. 17

actuated manually by a push button from a remote point, by a thermostat, by a time switch, by a pressure switch or by connecting it directly across the motor starter. In general, solenoid valves

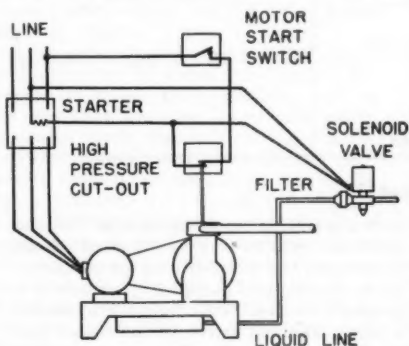


FIG. 18

are used for temperature control by starting or stopping the flow of refrigerant either in the liquid line or the suction line. Solenoid valves are also used to positively close liquid lines dur-

ing the off cycle of the compressor. Normally where thermostatic expansion valves are used the thermostatic expansion valve will close off during the off cycle unless the bulb is installed in a location where its temperature will be higher than the evaporator temperature. However, there are many applications where it is desirable to use a solenoid valve merely to close off the liquid line during the off cycle.

**IF SOLENOID VALVE WON'T OPEN,
CHECK THE FOLLOWING:**

- 1—DIRT
- 2—SLUDGE
- 3—LOW VOLTAGE
- 4—IMPROPER CONNECTION
- 5—CONNECTED IN SERIES WITH
HOLDING COIL OF MOTOR STARTER
- 6—OPEN CIRCUIT
- 7—BURNT OUT COIL
- 8—POOR CONTACT ON ACTUATING DEVICE
- 9—HIGH PRESSURE
- 10—BODY DEFORMED

**IF SOLENOID VALVE
WON'T CLOSE,
CHECK THE FOLLOWING:**

- 1—DIRT
- 2—SLUDGE
- 3—CONGEALED OIL
- 4—BODY DEFORMED
- 5—FAILURE TO OPEN CIRCUIT

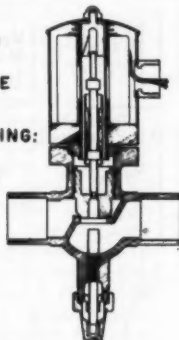
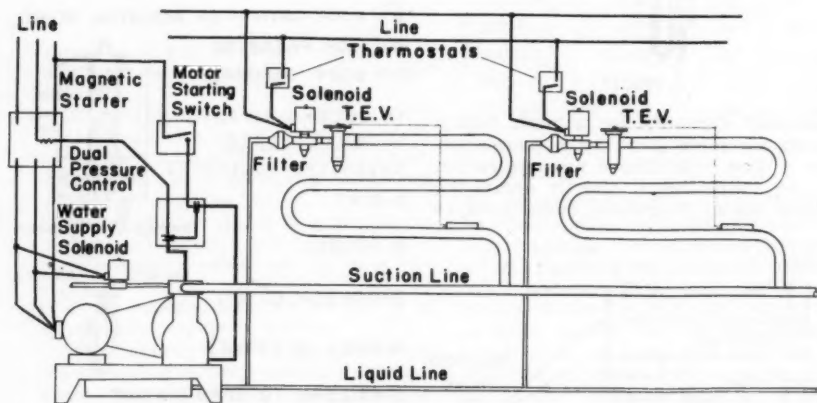
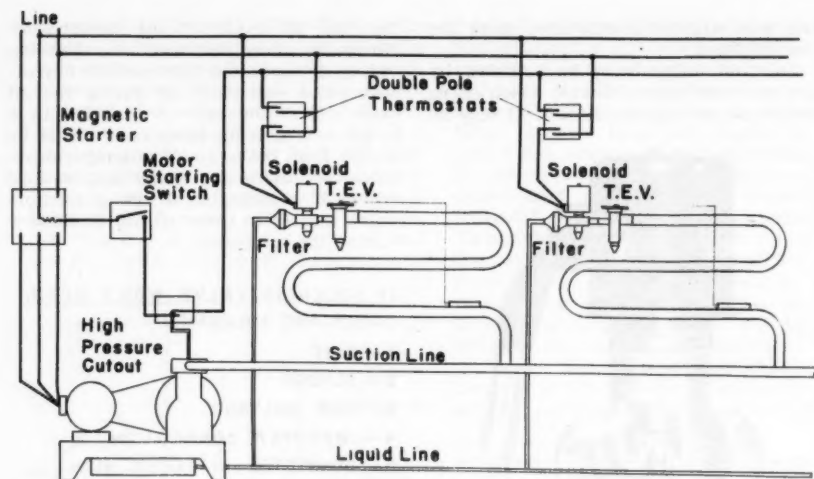


FIG. 21

The wiring diagram in Fig. 18 shows a simple hook-up of a solenoid valve that is connected directly across the magnetic starter. The magnetic starter might be operated by a push button or thermostat. At the same time that the magnetic starter starts the compressor motor the circuit is also completed to the solenoid valve coil and the solenoid valve opens. When the circuit is broken and the compressor motor stops the solenoid valve closes. This wiring diagram in Fig. 19



Figs. 19 and 20

shows solenoid valves used for temperature control on a multiple system. One pole of each thermostat controls the solenoid valve and the other pole of the thermostat starts the compressor motor. On this multiple system the solenoid valves open independently as each room or fixture requires refrigeration. As the temperature in each room is satisfied that solenoid valve closes. The last thermostat to open up stops the compressor and the first one that makes contact starts the compressor. Fig. 20

shows a similar hook-up except that the solenoid valves are controlled from single pole thermostats and the compressor is started and stopped by means of a pressure switch. This figure also shows a small solenoid valve in the water line to the compressor, which opens when the compressor is running and closes when the compressor stops. It is connected directly across the supply line to the compressor motor.

Because of the fact that solenoid valves depend in part upon gravity to

close them when the electrical coil is de-energized solenoid valves should always be installed in a vertical position with the electrical coil at the top. In soldering copper tubing into solenoid valves with sweat connections be careful not to overheat the valve body because excessive heat might deform or warp the body. This might prevent the valve from operating properly. Also, be careful not to heat up the coil. Where there is danger of this it is advisable to remove the coil while soldering.

As to servicing solenoid valves, in case they fail to open Fig. 21 shows a few things to look for. Dirt or sludge, particularly on the piston, might prevent the valve from opening. Also, as explained before, if the voltage is exceptionally low the valve might not have enough power to open. Where a solenoid valve is connected into the motor starting switch circuit of the compressor be sure to connect the solenoid coil in parallel with the holding coil of the magnetic starter instead of in series

with it. Occasionally this mistake is made in the field with the result that there is only about half enough voltage across the coil as it should have. Follow the wiring diagram carefully in this connection. A burnt out coil might be the cause of the valve not opening. Another cause is excessively high pressure—pressure above the rated maximum operating pressure of the valve. The trouble might also be due to the fact that the contacts of the actuating device are dirty and the circuit is not being completed. It may be due to improper connection or an open circuit somewhere in the wiring. If the valve body is deformed because of overheating or because of mechanical damage the valve may not open.

If the valve fails to close when it should it again may be due to dirt around the piston or between the valve and the seat, or it may be due to sludge or congealed oil around the piston. If the body is deformed the valve may fail to close.

Repaint Trade-ins For Quicker Turnover

By HERBERT HANLEY

APLIANCE dealers who accept trade-ins and then try to resell them without an "appearance overhaul" are making a serious mistake, according to Ed Bass, Jr., head of Fryar's, huge appliance dealership on West Flagler street in Miami.

Bass, who has been merchandising appliances for 14 years, has "gotten the jump" on many other dealers, due to the fact that the store is always ready to accept trade-ins. "By using assembly-line methods, we have always been able to make a liberal allowance, recondition, repaint, and resell a refrigerator with a 90-day guarantee, with usually a small profit, and at least breaking even on each," he said. "We try to keep the reconditioned refrigerator department a completely separate operation, and in that way, clear the deck for new box sales."

Through following automobile-factory methods, whereby a crew of four mechanics are split into separate departments for tearing down, overhauling, reassembling and repainting used boxes, the Fryar's concern can handle a heavy

volume in the repair shop which makes up the rear of the building. Through the use of a paint spray booth, machine surfacing, etc., which may be operated by one man, Bass has been able to hold down his cost per paint-spray job to approximately \$7.50 per refrigerator.

Fryar's paints every used refrigerator taken in trade, irrespective of whether it needs mechanical attention or not. Many serviceable refrigerators, with condensing units in good condition, will sell for \$25 or \$35 more if they are given a new paint job, he has found. Scratches, nicks, chipped spots, etc., all destroy the eye-appeal of the refrigerator, which is one of its most saleable qualities, it was pointed out. "Therefore, even though the finish is not badly damaged, we make a point of painting every one."

Used refrigerators, after reconditioning and a 12-hour bench test which shows up any leak, operating deficiencies, etc., are sold through a large doorway at the rear of the store. A stock of them is always kept stacked up here, where limited-income customers may look them over carefully, and make a selection. Prices may range anywhere from \$75 to \$110, depending upon the amount of work, drayage, etc. which has been involved.



REMOVE:
HEAT &
HUMIDITY



CONTROL:
SMOKE &
ODORS

Fig. 1—The purpose of air conditioning is to remove heat and humidity and to control smoke and odors.



SENSIBLE HEAT



LATENT HEAT

Fig. 3—There are two kinds of heat in air conditioning, sensible heat and latent heat.

Simplifying Your Air Conditioning Problem

By D. D. WILE*

COMFORT air conditioning, as shown in Fig. 1, involves three basic problems:

1. Removal of Heat
2. Reduction of Humidity
3. Control of Smoke and Odors

To be successful, an air conditioning system must accomplish each of these three things. Most of us have experienced so-called air conditioning where the system was unsuccessful because of

smoke or because the humidity was too high even though the temperature was satisfactory.

As shown in Fig. 2, heat and moisture are removed by a refrigeration coil in the air circulating system. Smoke and Odors are controlled by bringing in outside air.

The purpose of this paper is to present a simplified method for determining the heat and moisture load, and to simplify the selection of the proper coil to balance that load.

For those who do not actually estimate air conditioning jobs, this information should prove useful as a guide in servicing or modifying air conditioning systems. In service work it is often important to know the limitation of an existing system. Many service problems are the result of overloading or misusing an otherwise good system.

Furthermore, most of us receive requests for "a little air conditioning", "just to remove some of the heat", or "just to reduce the humidity a little." You will learn with experience that too little air conditioning is worse than none. When the air condition system fails to keep up with the heat load or moisture load it usually becomes more uncomfortable than if the windows were open and the system turned off.

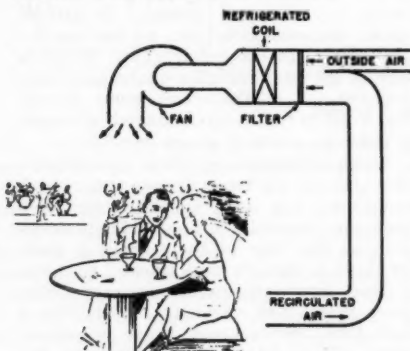


Fig. 2—Air Conditioning removes heat, controls smoke and odors.



BTU PER HR. PER PERSON



Fig. 4—The heat load from people in various states of Activity.

Two Kinds of Heat

Ordinarily we think of one kind of heat—just so many Btu.—as in an ordinary refrigeration system. In air conditioning we must deal with two kinds of heat, sensible heat and latent heat.

The heat we feel (sense) from a hot surface, see Fig. 3, is called sensible heat. To lower the temperature of air, sensible heat must be removed.

When water boils, as shown in Figure 3, the steam contains the heat of boiling. This is called latent heat. Moisture in the air contains this latent heat.

To lower the humidity, moisture must be removed and with it the latent heat. Most air conditioning systems involve both cooling and the removal of moisture. The total heat thus removed is the sum of the sensible heat and the latent heat. Let us now see just how much sensible heat and how much latent heat is involved.

Heat Ratio

One of the common terms used in air conditioning is the sensible heat ratio. It is simply the ratio of the sensible heat divided by the total of sensible and latent heat. Thus, if the sensible heat is 8 tons and the latent heat is 2 tons the sensible heat ratio will be 8 divided by 10, which gives .8 or 80 percent.

People give off sensible heat because their bodies are above room temperature and they give off latent heat with the evaporation of moisture from their bodies. As will be noted from Fig. 4, the



CFM OF OUTSIDE AIR PER PERSON



Fig. 5—The requirements for amount of outside air depends upon the amount of smoking.

amount of heat given off varies greatly with the type of activity. As compared to a person at rest, a person in active work may give off twice as much sensi-

TABLE NO. 1

VENTILATION & INFILTRATION (BTU PER HR. PER CFM)									
INSIDE: 78° D.B. 45% R.H.					INSIDE: 80° D.B. 50% R.H.				
OUTSIDE DRY BULB	OUTSIDE WET BULB	SENSIBLE HEAT MULTIPLIER	OUTSIDE DRY BULB	OUTSIDE WET BULB	SENSIBLE HEAT MULTIPLIER	OUTSIDE DRY BULB	OUTSIDE WET BULB	SENSIBLE HEAT MULTIPLIER	OUTSIDE DRY BULB
65	70	75	75	80	80	85	90	95	100
75	80	85	90	95	100	105	110	115	120
85	-2	15	34	7	95	15	28	37	15
90	-7	10	29	12	100	10	23	32	20
95	-12	5	24	17	105	5	18	27	25
100		0	19	22	110	0	13	22	30
105		-5	14	27	115	-5	8	17	35

VENTILATION & INFILTRATION

SAN FRANCISCO



BTU PER HR. PER CFM

LOS ANGELES



SACRAMENTO



NEEDLES



Fig. 6—The heat load from ventilating air varies widely for different localities.

ble heat and five times as much latent heat. Where many people congregate; such as restaurants and theatres, the heat from their bodies may be the largest single item in the heat load calculation.

While numerous methods have been proposed for eliminating smoke and odors, the fact remains that most air conditioning systems rely upon the introduction of outside air, as indicated in Fig. 2. How much outside air is required? From a practical standpoint, the answer depends upon how many people are smoking. Fig. 5, shows the ventilation requirements for people who are not smoking, smoking lightly, or smoking heavily. Most restaurants, stores and offices fall into the light smoking class. Night clubs, and certain types of clubrooms fall into the heavy smoking class.

When hot, moist air is drawn in from the outside it is necessary to remove both sensible and latent heat in order to reduce it to comfortable conditions. The amount of heat removed varies greatly with the location. Fig. 6, is an example of the large variation in load from outside air that exists within the state of California. Note that in San Francisco the sensible heat is not only small, but the latent load is negative. In other words, the outside air may help to balance part of the inside latent load. This figure makes it very evident why "rules of thumb" may be dangerous unless used with discretion. It is obvious that the "rules of thumb" which apply to San Francisco would be completely out of order in Needles.

In order to compute the load due to outside air, table 1, will be found convenient. It gives the sensible and latent heat load per cfm of outside air for various temperatures and for two inside conditions. To use this table the outside design conditions must, of course, be known and table 2, shows the recommended outside design conditions for many cities in the United States.

Every electrical and gas appliance, including electric lights, contributes to the air conditioning load. This part of the load may be very important and no item should be ignored. Table 3, lists the heat gain, both sensible and latent, from a number of electrical and gas appliances.

Wherever the actual electrical input

Table 2—Outside Design Conditions

STATE	City	Winter (Heating)	Summer (Cooling)	
		Dry Bulb °F	Dry Bulb °F	Wet Bulb °F
Alabama				
	Birmingham	10	95	78
	Mobile	15	95	80
	Montgomery	10	95	78
Arizona				
	Flagstaff	-10	90	65
	Phoenix	25	105	76
	Tucson	25	105	72
	Yuma	30	110	78
Arkansas				
	Little Rock	5	95	78
California				
	Bakersfield	25	105	70
	El Centro	25	110	78
	Fresno	25	105	70
	Long Beach	35	90	70
	Los Angeles	35	90	70
	Needles	25	115	80
	Oakland	30	85	65
	Pasadena	30	95	70
	Sacramento	30	100	72
	San Bernardino	30	105	72
	San Diego	35	85	68
	San Francisco	35	85	65
Colorado				
	Denver	-10	95	64
Connecticut				
	Bridgeport	0	95	75
	Hartford	0	95	75
	New Haven	0	95	75
Delaware				
	Wilmington	0	95	78
D. of C.				
	Washington	0	95	78
Florida				
	Jacksonville	25	95	78
	Miami	35	91	79
	Pensacola	20	95	78
	Tampa	30	95	78
Georgia				
	Atlanta	10	95	76
	Augusta	10	98	76
	Brunswick	20	95	78
	Columbus	10	98	76
	Savannah	20	95	78
Idaho				
	Boise	-10	95	65
Illinois				
	Chicago	-10	95	75
	Peoria	-10	95	76
Indiana				
	Fort Wayne	-10	95	75
	Indianapolis	-10	95	76
Iowa				
	Des Moines	-15	95	77
	Sioux City	-20	95	77
Kansas				
	Wichita	-10	100	75
Kentucky				
	Louisville	0	95	78
Louisiana				
	New Orleans.....	20	95	79
	Shreveport	10	100	78
Maine				
	Augusta	-15	90	73
	Bangor	-20	90	73
	Portland	-5	90	73
Maryland				
	Baltimore	0	95	78
	Cumberland	0	95	75
Massachusetts				
	Boston	0	92	75
	Fitchburg	-10	93	75
	Springfield	-10	93	75
	Worcester	-5	93	75

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Table 2—Continued

STATE	City	Winter (Heating)	Summer (Cooling)	
		Dry Bulb °F	Dry Bulb °F	Wet Bulb °F
Michigan				
	Detroit	—10	95	75
	Flint	—10	95	75
	Grand Rapids	—10	95	75
	Saginaw	—10	95	75
Minnesota				
	Duluth	—30	93	73
	Minneapolis	—20	95	75
	St. Paul	—20	95	75
Mississippi				
	Vicksburg	10	95	78
Missouri				
	Kansas City	—10	100	75
	St. Louis	—10	95	78
Montana				
	Billings	—25	90	66
	Helena	—20	95	65
	Missoula	—15	95	66
Nebraska				
	Lincoln	—15	95	77
	Omaha	—15	95	77
Nevada				
	Reno	— 5	95	65
New Hampshire				
	Concord	—15	90	73
	Manchester	—10	90	73
	Portsmouth	0	90	73
New Jersey				
	Jersey City	0	95	75
	Newark	0	95	75
	Trenton	0	95	78
New Mexico				
	Santa Fe	— 5	95	65
New York				
	Albany	—10	93	75
	Buffalo	— 5	93	75
	New York	0	95	75
	Rochester	— 5	93	75
	Syracuse	—10	93	75
North Carolina				
	Asheville	0	93	75
	Charlotte	5	95	75
	Greensboro	5	95	75
	Raleigh	5	95	76
	Wilmington	15	95	78
North Dakota				
	Bismarck	—30	95	73
Ohio				
	Akron	— 5	95	75
	Cincinnati	0	95	78
	Cleveland	— 5	95	75
	Columbus	—10	95	76
	Dayton	0	95	76
	Toledo	—10	95	75
	Youngstown	— 5	95	75
Oklahoma				
	Oklahoma	0	101	77
	Tulsa	0	101	77
Oregon				
	Baker	— 5	90	66
	Portland	10	90	68
	Roseburg	10	90	66
Pennsylvania				
	Altoona	— 5	95	75
	Erie	— 5	93	75
	Harrisburg	0	95	75
	Oil City	—15	95	75
	Philadelphia	0	95	78
	Pittsburgh	— 5	95	75
	Scranton	— 5	95	75
Rhode Island				
	Pawtucket	0	93	75
	Providence	0	93	75
South Carolina				

Table 2—Continued

STATE	City	Winter (Heating)	Summer (Cooling)	
		Dry Bulb °F	Dry Bulb °F	Wet Bulb °F
	Charleston	15	95	78
	Columbia	10	95	75
	Greenville	10	95	75
South Dakota				
	Sioux Falls	-20	95	75
Tennessee				
	Chattanooga	10	95	76
	Knoxville	0	95	75
	Memphis	0	95	78
	Nashville	0	95	78
Texas				
	Dallas	10	100	78
	El Paso	10	100	69
	Fort Worth	10	100	78
	Galveston	20	95	80
	Houston	20	95	78
	San Antonio	20	95	78
Utah				
	Salt Lake	-10	95	65
Vermont				
	Burlington	-15	90	73
	Rutland	-15	90	73
Virginia				
	Norfolk	15	95	78
	Richmond	10	95	78
	Roanoke	0	95	76
Washington				
	Seattle	15	85	65
	Spokane	-15	93	65
	Tacoma	15	85	64
	Walla Walla	-5	95	65
	Wenatchee	-10	90	65
	Yakima	-5	95	65
West Virgin'a				
	Bluefield	-10	95	75
	Charleston	0	95	75
	Huntington	-5	95	76
	Parkersburg	-10	95	75
	Wheeling	-5	95	75
Wisconsin				
	Madison	-15	95	75
	Milwaukee	-15	95	75
Wyoming				
	Cheyenne	-15	95	65

is known, as in the case of electric lights, the heat load in Btu. per hr. is determined by simply multiplying the watts by 3.4. The fan in the air conditioning system also adds heat and must be included in the estimate. Allow 3400 Btu. per hp. if the motor is within the conditioned space and 2500 Btu. per hp. if the motor is not within the conditioned space.

The Estimating Form

Table 4, shows a form for estimating air conditioning jobs. On this one sheet is included all of the items which generally must be considered. It is important that the job be carefully inspected for other sources of heat which may not be on the list.

The infiltration figures given in table

Table 3—Heat Gain From Appliances in Btu. Per Hour

APPLIANCE	ELECTRICAL		GAS	
	Sensible	Latent	Sensible	Latent
Coffee Brewer, 1/4 Gallon.....	900	200	1,350	350
Coffee Brewer Unit, 4 1/4 Gallon.....	4,800	1,200	7,200	1,800
Coffee Urn, 3 Gallon.....	2,400	1,600	2,700	2,700
Coffee Urn, 5 Gallon.....	3,400	2,300	3,900	3,900
Food Warmer, per sq. ft. of top surface.....	350	350	850	450
Fry Kettle, per sq. ft. of fry area.....	3,500	5,000	6,000	4,000
Griddle, per sq. ft. of fry area.....	1,800	1,000		
Grille, meat, per sq. ft. of fry area.....	4,700	2,500	10,000	2,500
Grille, sandwich, per sq. ft. of area.....	2,700	700		
Stoves, short order, per sq. ft. of top.....			3,600	3,600
Toaster, belt driven, 2 slices wide.....	5,100	1,300	7,700	3,300
Toaster, belt driven, 4 slices wide.....	6,100	2,600	12,000	5,000
Waffle Iron, 20 waffles per hour.....	1,100	750		
Hair Dryer, Blower.....	2,300	400		
Hair Dryer, Helmet.....	1,700	330		
Permanent Wave Machine.....	850	150		
Sterilizer for Physicians Instruments.....	650	1,200		

* Note:—When hooded, use half of the above values.

4, are based upon experience with reasonably well constructed buildings. The infiltration will be considerably less for a well constructed and weather-stripped building, and on the other hand, may be many times more for a poorly constructed building.

Comparison of Two Actual Jobs

Let's take, for example, a store that has been air conditioned but is to be re-occupied by a restaurant. Will the same air conditioning system work? Fig. 7, shows the details of an air conditioning estimate for the store and for the restaurant. Remember that the physical structure of the building has remained the same, therefore, the first four items referring to walls, windows, floors, and ceilings are unchanged. Since the store was very well lighted, it was found desirable to reduce the light intensity for the restaurant and thus also reduce the heat load from this source. It will be noted, however, that an appliance load in the form of a coffee urn has been added. The largest gain in heat load comes from the increased number of people that occupy the restaurant and the increased ventilation that they require. As a matter of fact, infiltration of air was sufficient for ventilation purposes with the store. The totals indicate that the sensible heat load increases only slightly while the latent load increases considerably.

For the store the ratio of sensible heat to total heat (sensible heat ratio) was 87%. For the restaurant with its high latent load this ratio drops to 69%. Thus, in the same building the store had a rather high sensible heat ratio and the restaurant a very low one.

Coil Performance

When selecting coils, keep in mind that the sensible heat ratio of the coil may be lower but should never be higher than the sensible heat ratio of the load. If it is higher than the sensible heat ratio

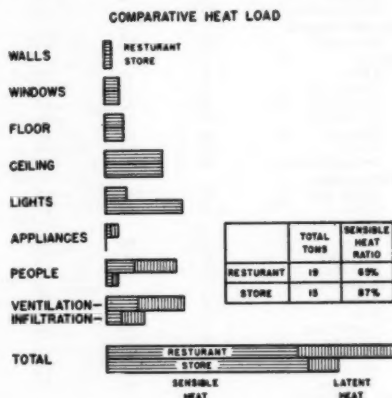


Fig. 7—Comparison of the heat load of a restaurant and a store in identical buildings.

Table 4—Cooling Load Estimating Form

ITEM	Quantity	Multiplier		Sensible Load	Latent Load
1. WINDOWS exposed to Sun (Use only exposure with largest load)	Sq. Ft.	Inside Shades	Outside Awnings		
East, Southeast.....		45	25		
Southwest.....		65	40		
West.....		100	60		
Northwest.....		35	25		
	Sq. Ft.	OUTSIDE D.B.			
		90	100	110	
2. WINDOWS facing North or in the shade.....		12	22	32	
3. WALLS	Sq. Ft.				
Masonry or Frame.....		4	6	8	
Insulated.....		2	4	5	
Glass Brick (no sun).....		5	10	15	
Interior partition single thickness.....		7	12	17	
Interior partition double thickness.....		4	7	10	
4. ROOF	Sq. Ft.				
No ceiling.....		16	20	24	
With ceiling.....		14	17	21	
Ceiling under attic.....		12	15	18	
Under occupied floor.....		4	6	8	
Insulated.....		4	6	8	
5. FLOORS	Sq. Ft.				
		3	5	7	
6. LIGHTS	Watts	3.4			
7. MOTORS	H.P.	3400			
8. APPLIANCES (See Table No. 3)	No. Units	Sensible	Latent		
9. PEOPLE	Number	Sensible	Latent		
Theatre, Office, Hotel.....		200	200		
Restaurant, Drug Store.....		220	330		
Dancing, Light Factory Work.....		250	600		
Heavy Work.....		450	1000		
10. INFILTRATION	cfm	See Table No. 1			
Room Volume.....					
(One Outside Wall).....	60 = cfm				
Room Volume.....					
(Two Outside Walls).....	40 = cfm				
Room Volume.....					
(Three or more Outside Walls).....	30 = cfm				
Swinging door, 100 cfm per passage					
Revolving door, 60 cfm per passage					
11. VENTILATION (Use only the excess over item 10)	cfm	See Table No. 1			
Smoking No. People					
None.....	x 7½ = cfm				
Light.....	x 15 = cfm				
Heavy.....	x 40 = cfm				

Total
Total Sensible & Latent

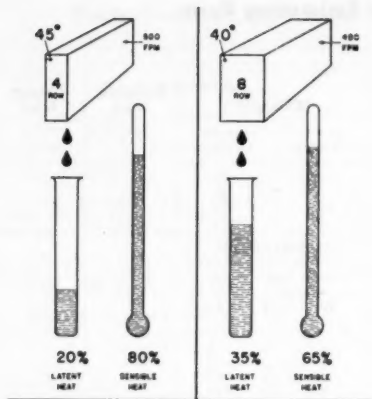


Fig. 8—Comparison of the Sensible and Latent Heat capacity of Air Conditioning Coils.

of the load, the humidity will be too high.

How much difference will there be in the cooling coils for these two jobs? Fig. 8, shows that the store load was carried by a 4-row coil operating at 45° refrigerant temperature and with a face velocity of 500 fpm. The manufacturer's rating data for coils shows that in order to obtain the very low sensible heat ratio for the restaurant an 8-row coil must be used, the evaporating temperature will have to be 40° F and the face velocity 400 fpm. While this is a somewhat thicker coil than ordinarily used it is by no means unusual. This problem emphasizes the great difference that may be encountered for different types of air conditioning loads. It should be noted that the mere fact that the same building was involved had little to do with the proper equipment selection.

Coil Selection

Coil catalogues have tables showing performance of coils for various depths and from them the proper depth and face areas can be selected. But then, how about the specifications of the coils? See Fig. 9.

These are all questions that must be decided either by you or, upon your request, by the manufacturer who supplies the coil. This job of selecting details of coil design has in the past been a nuisance. In order to simplify this problem, we have engineered a series

of 96 coils covering face areas from .8 to 20 sq. ft. for direct expansion, cold water cooling, hot water heating, and steam heating. These coils are all rated at nominal operating conditions which approximate the average air conditioning installation. As shown in Table 5, complete data is given so that one of these pre-engineered coils may be selected to fit almost every type of air conditioning load.

Wet Bulb Temperature and Relative Humidity

Coil performance depends upon the wet bulb and dry bulb temperatures of the entering air. Often, however, the percentage of relative humidity is given instead of wet bulb temperature. Table 6, shows the relation between wet bulb temperature and relative humidity. It will be found convenient for converting from one to the other.

When selecting a coil for a system using outside air it must be remembered that the wet bulb and dry bulb temperature of the air entering the coil is the result of mixing the outside and re-circulated air. To determine the temperature of this mixture has in the past been somewhat of a problem. In order to simplify this procedure Figs. 10 A, and 10 B, have been prepared. To use these figures, first determine the percentage of outside air to the total air circulated through the coil. Then on Chart 10 A, draw a line between the inside wet bulb temperature and the outside wet bulb temperature. Where this line crosses the percent of outside air, read the wet bulb temperature of the mixture. In similar manner, the dry bulb temperature of the mixture is determined from chart 10 B.

Rules of Thumb

Experience is the best teacher and from experience we learn many shortcuts which simplify the air conditioning problem. Good operation will be insured if these shortcuts are handled by an experienced person and used with good judgment. Some of these "rules of thumb" are shown in Table 7. Referring to Table 7:

1—Air velocity seldom varies greatly from 500 fpm. Below that velocity the coil capacity falls off rapidly. At velocities too greatly above 500 fpm noise may become a problem and there is the

Table No. 5 - STANDARD DIRECT EXPANSION COILS - 6 ROWS

Rated at: 67° W. B. Entering Air Temperature 40° Freon-12 Evaporating Temperature		500 FPM Face Velocity 1.75 tons per sq. ft. of Face Area										
Coil Number		AC602	AC603	AC604	AC605	AC606	AC607	AC608	AC609	AC610	AC611	AC612
Nominal Rating	Tons	1.4	2.1	2.8	4.0	5.8	7.7	10.8	14.0	17.7	21.4	35.0
Face Area	sq. ft.	8	12	16	23	33	44	62	80	101	122	20
Number of Tubes Wide		4	4	6	8	8	10	10	12	16	18	20
A Width of Face	Ins.	8	8	11.5	15	15	18.5	18.5	22	29	32.5	36
B Length of Face	Ins.	14	22	20	22	32	34	48	52	50	54	80
C Width over Flanges	Ins.	11	11	14.5	18	18	21.5	21.5	25	32	35.5	39
D Length over Flanges	Ins.	17	25	23	25	35	37	51	55	53	57	83
E Length over Header	Ins.	19½	27½	26	28	38½	41	55	59½	57½	61½	87½
F Thickness over Flanges	Ins.	10	10	10	10	10	11	11	11	11	11	11
Suction Connection	Ins.	1½	1½	1½	1½	1½	2½	2½	2½	2½	2½	(2) 2½
Header O. D.	Ins.	1½	1½	1½	1½	2½	2½	2½	3½	3½	3½	(2) 3½
Number of Circuits		2	2	3	4	8	10	10	12	16	18	40
Distributor Connection	Ins.	¾	¾	¾	¾	1½	1½	1½	1½	1½	1½	(2) 1½
Header Arrangement	Fig. No.	5a	5a	5a	5a	5a	5a	5a	5a	5a	5b	5b

Note: (2) indicates two distributors and two headers are used.

**TABLE NO. 6
RELATIVE HUMIDITY TABLE**

PERCENT RELATIVE HUMIDITY	DRY BULB TEMPERATURE °F.															
	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100
	WET BULB TEMPERATURES °F.															
40	55.8	57.4	59.0	60.5	62.0	63.5	65.1	66.7	68.2	69.7	71.3	72.8	74.4	76.0	77.6	79.3
45	57.2	58.8	60.4	62.0	63.6	65.2	66.8	68.4	69.9	71.5	73.1	74.7	76.4	78.1	79.7	81.4
50	58.5	60.2	61.8	63.4	65.1	66.8	68.4	70.0	71.6	73.3	74.9	76.6	78.3	80.0	81.7	83.4
55	59.8	61.5	63.1	64.8	66.4	68.1	69.7	71.3	72.9	74.5	76.2	77.8	79.5	81.2	82.9	84.6
60	61.0	62.7	64.4	66.1	67.7	69.4	71.0	72.6	74.2	75.8	77.4	79.0	80.6	82.2	83.8	85.4

**TABLE NO. 7
RULES OF THUMB**

I	COIL FACE VELOCITY 500 FPM	
II	AIR QUANTITY 300 to 400 CFM PER TON	
III	EVAPORATING TEMPERATURE 40° to 45°	
IV	INSIDE DESIGN CONDITIONS	
	HUMID CLIMATE	80° DB, 50% RH.
	HOT DRY CLIMATE	80 DB, 40% RH.
	COOL DRY CLIMATE	78 DB, 45% RH.
V	COIL DEPTH	CLIMATE
	4 ROW	DRY
	6 ROW	DRY
	8 ROW	HUMID
		LATENT LOAD
		LOW
		HIGH
		LOW
		HIGH

COIL SELECTION

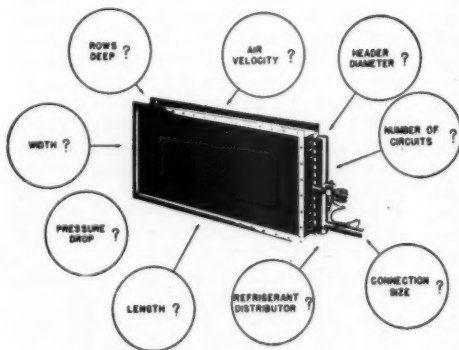


Fig. 9—Selecting the Air Conditioning Coil sometimes involves numerous details.

possibility of blowing water off the coil.

2—The amount of air circulated per ton of refrigeration load may vary considerably with different types of jobs. Good practice is between 300 and 400 cfm per ton.

With 4-row coils (High Sensible Heat Ratio) 500 fpm will generally work out to about 400 cfm per ton. With 6-row coils 500 fpm will work out to more nearly 300 cfm per ton.

RESULT OF MIXING OUTSIDE AND RECIRCULATED AIR

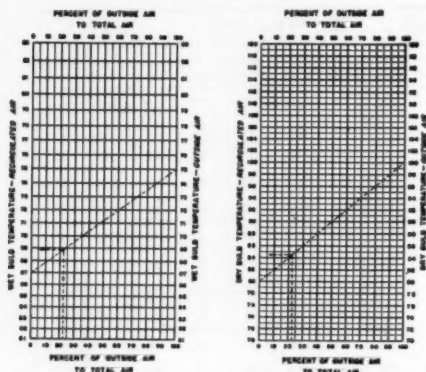


Fig. 10A—To find the wet bulb temperature after mixing inside and outside air draw a straight line between the inside wet bulb temperature in the left hand column and the outside wet bulb temperature in the right hand column, read the wet bulb temperature of the mixture where this line crosses the percentage of outside air.

Fig. 10B—To find the dry bulb temperature after mixing inside and outside air draw a straight line between the inside dry bulb temperature in the left hand column and the outside dry bulb temperature in the right hand column, read the dry bulb temperature of the mixture where this line crosses the percentage of outside air.

3—Evaporating temperature may vary widely but for direct expansion coils it will generally fall close to the range of 40° to 45°F. Below 40° compressor capacity and efficiency will be sacrificed while at greatly above 45° the sensible heat ratio may be too high and too much coil may be required.

4—In air conditioning, do not expect one temperature and humidity to please everyone. This is no different from the problem in heating. Therefore, the temperature and humidity maintained in the air conditioned space is a compromise based upon experience. The values shown in figure 6 have, by and large, proven most acceptable.

5—The "rules of thumb" governing coil depth are quite general but may vary somewhat with different individuals. For instance, in the Los Angeles area there are some engineers who almost invariably use 4-row coils and

others who generally use 6-row coils. Now, why is it that both may have successful jobs? It is simply because the fellow with the 4-row coils is working with low face velocity and low suction pressure. Also most of his jobs are for stores and types of establishments where the latent load is low. For high latent loads he, too, would go to thicker coils.

Good air conditioning is not a matter of guess work. The heat load is made up of numerous items that can be calculated individually, however, "rules of thumb" based on experience and a suitable calculating form greatly simplify the problem.

The selection of the coil to balance the load is made easier by a series of pre-engineered coils which meet the requirements for most applications.

Acknowledgement

In the preparation of this paper the author has, with permission, drawn freely upon the ACRMA Equipment Standards—1946 Edition and the ACRMA Application Engineering Standards for Air Conditioning for Comfort, published and copyrighted by the Air Conditioning and Refrigerating Machinery Association, Southern Building, Washington 5, D. C.

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NERA CONFERENCE ON INSTALLATION PROBLEMS

NEED for industry-wide cooperation to alleviate the high cost of installing electrical appliances was the subject for discussion when the NERA Committee on Installation Problems met with representatives of manufacturers, utilities and electrical contractors at the Bismarck Hotel, Chicago.

Wendal D. Lewis, Chairman of the NERA Committee on Installation Problems, and manager of the appliance department of the Klode Furniture Company, Milwaukee, Wisconsin, presided at the round table conference, as well as as the dealer committee meeting which preceded the joint session.

He stated that the purpose of the conference was to endeavor to develop ways and means wherein installation costs may be reduced wherever they are exorbitantly high, and to provide wherever needed a higher quality of installation service.

Solving Your Moisture Problems

By K. M. NEWCUM*

THE prime purpose of a drier-filter is to reduce the moisture content of the refrigerant sufficiently low that moisture will not be frozen out at the refrigerant control and clog it up or otherwise stop the flow of the refrigerant. An equally important function of the drier is to either reduce or maintain the moisture and acid content of the refrigerant to a sufficiently low point that harmful corrosion is eliminated. The third purpose is to efficiently filter foreign matter from the refrigerant stream.

The drier-filter should perform these functions without causing other difficulties, such as, clogging or plugging in the drying agent bed or at the outlet filter, or causing pressure drop, which materially reduces the capacity and efficiency of the system.

A large percentage of the drier failures has been from the mechanical angle; that is the actual breaking down of the drying agent into fine powder and dust resulting in excessive pressure drop, and, finally, clogging. When one stops to analyze the reason for this clogging and plugging in driers, he need only to review the history of drier design.

The original driers, years ago, were built of pipe, somewhere in the neighborhood of two inches in diameter, with the ends filled with wool, steel wool, or some other similar filter media, the inside of the pipe being filled with one of the available drying agents such as calcium chloride or calcium oxide, the ends being capped, and suitable fittings for attachment to the hot liquid line of the refrigerating system fitted into place. In the early stages commercial refrigerating systems were small, generally as small as $\frac{1}{2}$ horsepower or in that neighbor-

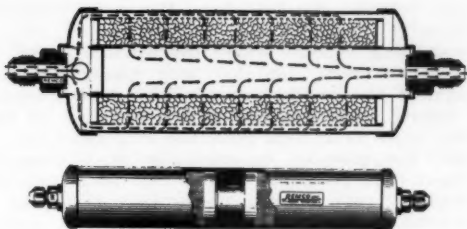


Fig. 1—"Cross-Flo" Drier-Filter.

hood. The refrigerant was methyl chloride, where small volumes were required to have a relatively large refrigerating effect, and the granule size of calcium chloride and calcium oxide generally was large and their exterior surfaces were irregular.

This paper is essentially the same as delivered by the author before various RSES conventions and meetings in recent months.

This resulted in a sufficient net flow area around and between the granules to accommodate the small amount of methyl chloride that was required to be circulated to do the small amount of refrigeration work in the small machine range. Consequently, the refrigerant could circulate around and between the granules at low velocity because of the small volume without causing the granules to be agitated or ground against one another.

As the size of the refrigerating systems increased, the driers then being manufactured as regular production items, simply were made longer to accommodate more drying agent. The diameter, hence the net flow area, remained approximately the same. This did not cause the industry much trouble from clogging and pressure drop until two important changes came along. One: Freon-12 came on the market, and due to the characteristics of this refrigerant a very much larger volume is required to be circulated to do a similar amount of refrigerating work as was done by methyl chloride. This meant that greater volumes were being circulated around

*President, Remco, Inc., Zelienople, Pa.

and between the granules. Hence the velocity increased, and we were approaching a point where the granules were becoming agitated and ground against one another due to this high velocity. And two: Silica Gel, which, due to its mechanical structure, requires that the granules be relatively small. Since they are small they fit and pack together very tightly, substantially reducing the net flow area available between and around the granules. Consequently, with the same, or an increasing volume of Freon-12 being forced through the drier, pressure drop became increasingly great to a point where the granules are agitated and ground against each other until they gradually pack so tightly together with the powder and dust that pressure drop becomes quite excessive, eventually to the point where the drier clogs and has to be changed. This condition becomes aggravated as the length of the drier is increased to accommodate more drying agent, because the net cross-sectional flow area remains the same, but as the length of the drier increases, the resistance to flow is likewise increased. Then, with the larger systems requiring greater volumes to be forced through the drier, the pressure drop becomes quite excessive, to a point where, in the larger systems, the drier may clog after having been on the job for only two or three hours, or, if left on the job, there is a pressure drop so excessive as to materially reduce over-all system performance.

Thin Bed for Easy Flow

To overcome this basic pressure drop difficulty and to allow sufficient flow area to accommodate the larger volumes of Freon-12 and Freon-22 through the silica gel, we investigated many other types of filter designs and found that automobile oil filters, automobile air filters, filters for purification of many liquids and gases, such as in gas masks, arranged their filter beds in a cartridge so that the flow was across a thin, narrow, cylindrical bed rather than through a long, tightly packed bed. Based upon this information, a cross flow drier-filter was designed as shown in Figure 1.

The refrigerant enters the inlet end, as shown by the arrows, and then flows evenly around and through the perfora-

ted outer cartridge case and through a thin, narrow, cylindrical bed of silica gel, and finally through a filter which extends from one end of the drier to the other, and then out through the center to the outlet end. The large flow area, the thin bed, and the large filter, which also has a very large flow area, reduce the velocity of the refrigerant to the extent that roiling, grinding, powdering, and dusting are eliminated. Therefore, pressure drop is entirely eliminated and the drier-filter may be permanently installed without the usual difficulties of clogging, plugging, and pressure drop.

Mechanical or Chemical Driers

Earlier in the discussion we mentioned the installation of calcium chloride and calcium oxide driers in the liquid line. Because calcium chloride and calcium oxide driers did such a good drying job in the hot liquid line, it was natural that we, being creatures of habit, should also install silica gel driers in the hot liquid line. However, we failed to take into consideration the basic difference in these drying agents.

Calcium chloride and calcium oxide are chemical absorbing agents. That is, they react chemically with water or moisture in the refrigerant stream. Therefore, the hot liquid line was the best place to install driers having calcium chloride and calcium oxide, because the higher the temperature, the faster the chemical reaction or the higher the rate of moisture absorption, because chemical reactions are accelerated by an increase in temperature.

To be more specific, moisture goes into solution with calcium chloride to form a brine. This made the material impractical for permanent use in a refrigeration system. Moisture unites chemically with calcium oxide until it finally breaks down into a powder. This made calcium oxide impractical because of the pressure drop and the tendency of the powder to flow through the outlet screens and into the systems. However, the drying efficiency of these two agents was higher in the hotter liquid line.

Silica gel is a mechanical adsorbing agent. That is, it mechanically adsorbs moisture into the small capillaries or pores of which the material is composed. Regardless of the amount adsorbed by

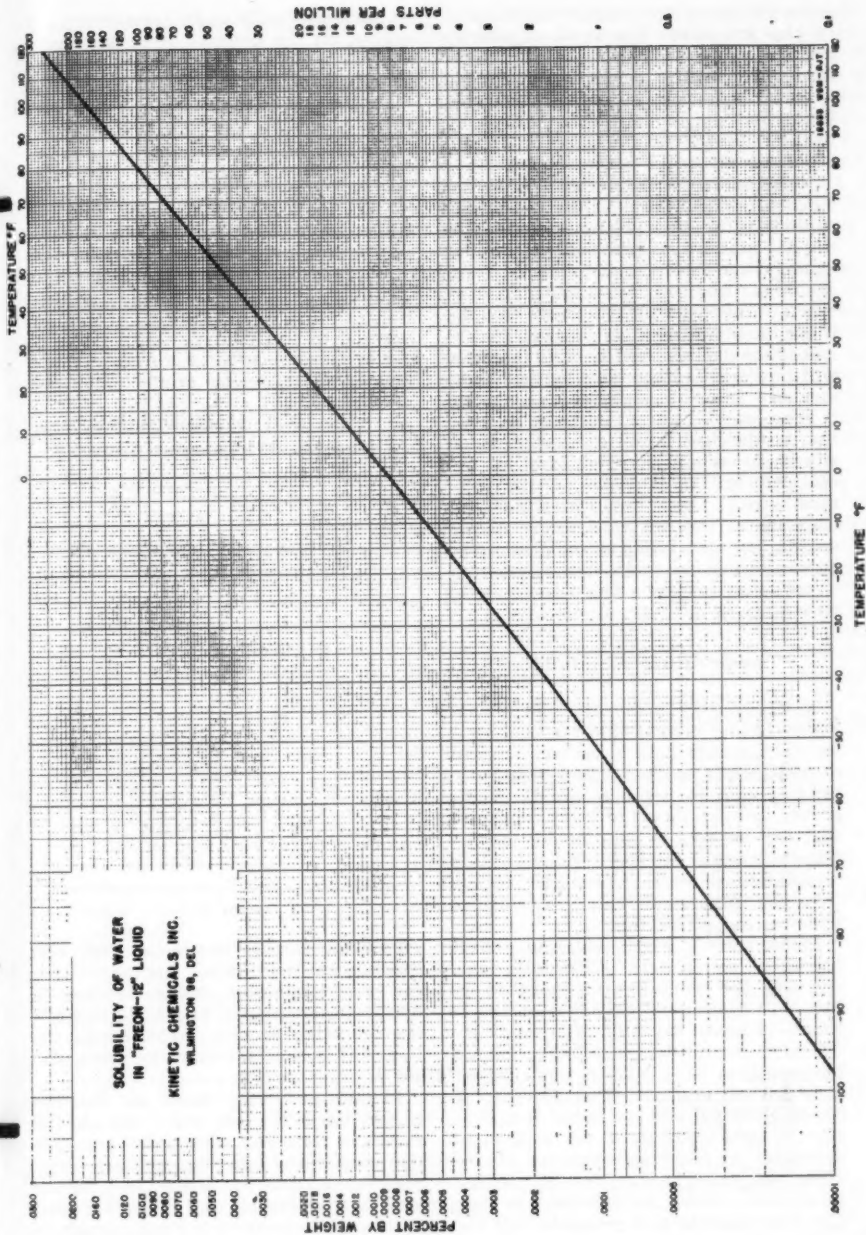


Fig. 2.

silica gel, there is no change in chemical or physical state. The small capillaries are always coated with moisture. Therefore, the moisture content of silica gel is reduced to predetermined desirable limits for use in refrigerant driers by heating it to a temperature of around 350 F. or 400 F. for several hours.

It becomes apparent that if heating silica gel drives the moisture out of the capillaries, placing a silica gel drier in the hot liquid line, especially in the hot summertime when liquid temperatures are high, may be the direct cause of much of our drier and moisture trouble. If the temperature of the wet refrigerant and of the drying agent is high, the drier will be very inefficient in the hot summer just when the refrigerating system is most needed. It is entirely possible that a silica gel liquid line drier which effectively removes moisture from the cool refrigerant stream in the cool months of the year may give some of it back up to the hot refrigerant stream during the hot summer months. The amount given up to the hot refrigerant stream may be just enough to result in freeze-ups at the expansion valve.

Temperature is a Factor

A second very important fact is that Freon-12 and methyl chloride and similar refrigerants hold a certain amount of moisture in solution, the amount depending upon the temperature, the higher the temperature the more moisture that can be held in solution by the refrigerant liquid (or gas). Moisture held in solution is more difficult to remove from the refrigerant than free moisture which is out of solution.

Please refer to Fig 2, which is a chart prepared by Kinetic Chemicals Inc. showing the solubility of moisture in Freon-12 liquid, and note that at 120 F. Freon-12 liquid can hold approximately 250 parts per million in solution. Liquid temperatures of 120 F. in the summer time are not unusual. Therefore, if the Freon-12 is wet and the liquid temperature is 120 F., 250 parts per million of moisture are held in solution. If the silica gel drier is installed in the hot liquid line, where the efficiency is lowest, it is possible and probable that the drier may reduce the moisture down from 250 parts per million to, say, 40 or

50 parts per million, this depending, of course, on the amount of drying agent and its moisture content before being installed.

To use this as an example; if the drier does reduce the moisture content to 50 parts per million, and then if the expansion valve and evaporator temperature is, for example, 0°F., the refrigerant leaving the drier with 50 parts per million, entering the expansion valve at 0°F. will automatically have the moisture squeezed out of solution down to approximately 10 parts per million. Moisture that is squeezed out of solution from 50 to 10 parts per million lays in the expansion valve and freezes there. This causes plugging of the valve and

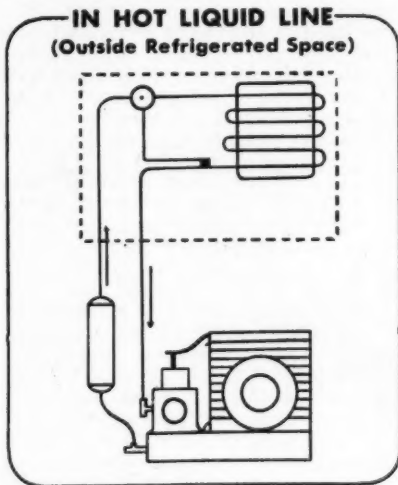


Fig. 3.

all of the service headaches and cost that result therefrom. Actually, then, the cold expansion valve becomes a better drier than the hot liquid line silica gel drier, merely by virtue of the fact that it is colder than the drier, and for no other reason.

Installing a new drier in the hot liquid line (Fig. 3) may reduce the moisture content a few parts per million and installing still another drier may bring it down further, but we are expecting a drying agent at its lowest efficiency, because of the high temperature, to bring the moisture content down to a low point to prevent it from freeze-

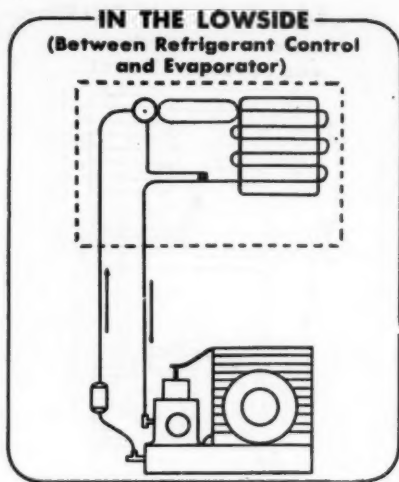


Fig. 4.

ing out in the expansion valve which is at a lower temperature.

Now, if we reverse the process and take advantage of the fact that at lower temperatures the moisture is squeezed out of solution, where it is in the form of free water or moisture and readily available to the drying agent, and remember that the lower the temperature of the drying agent, the lower the vapor pressure in the capillaries, and, hence, the higher its efficiency and the greater its capacity, then we have a solution to our moisture problems.

The result is that the drier should be installed in the coldest possible location in the system. There it will be at its highest efficiency and have the greatest capacity.

The lowest temperature location in the system is between the refrigerant control and the evaporator, as shown in Fig. 4. There are many thousands of home freezers and other low temperature cabinets in the field that have driers located between the refrigerant control and the evaporator that have proved this to be the most efficient location in the entire system since the drying agent and the refrigerant are at their lowest temperatures and hence at their highest efficiency. The question may logically be asked: Won't the moisture freeze out in the expansion valve before it gets to the drier? The answer is that during the

pull down, the drier is much more efficient in removing moisture than the expansion valve is. The moisture content of the refrigerant is reduced each time it circulates to a point where, when lower temperatures are reached, the refrigerant is too dry to result in a freeze-up. Even though the moisture should freeze in the expansion valve, the moment it is released it will be trapped in the drier and the system will immediately start functioning.

In some installations space or other limitations may preclude installing the drier between the expansion valve and the evaporator, in which case the drier may be installed at the outlet of the evaporator, as shown in Fig. 5. Since the refrigerant is also very cold at this location the efficiency is also very high. The same size drier, and a drier having the same capacity may be used.

If it is desired to use the drier also as an accumulator, it should be installed vertically, with the refrigerant entering at the bottom and coming out at the top.

Many refrigeration engineers desire to install the drier in the suction line, Fig. 6. Often this is very desirable. Since pressure drop is eliminated in this drier, permanent suction line application may be made. Its efficiency in the suction line may not be quite as high as in the low side because the temperature is not

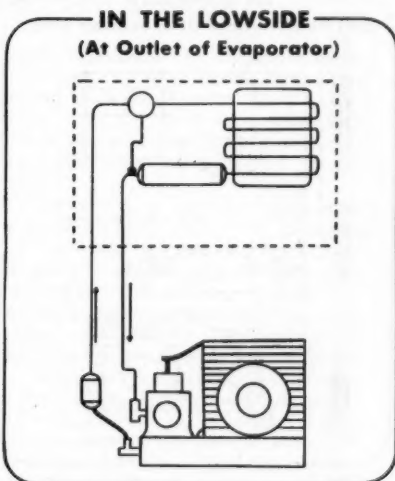


Fig. 5.

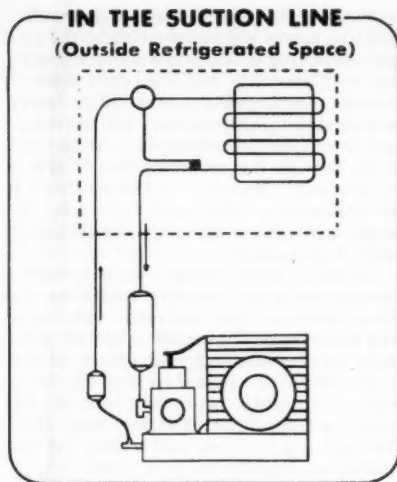


Fig. 6.

as low. Suction line application for sulphur dioxide is especially recommended, since tests by Ansul Chemical Company and others reveal that sulphur dioxide may be dried in the vapor form in the suction line, and, since pressure drop is eliminated, the drier may be installed permanently in the suction line of sulphur dioxide systems or systems having any other common refrigerants.

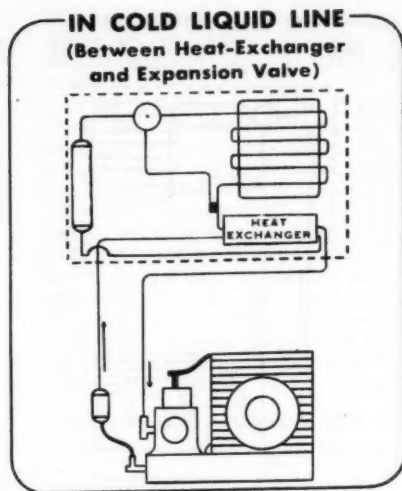


Fig. 8.

Full advantage may be taken of the high efficiency of the low side drier by installing the drier in a by-pass between the liquid line and the suction line. This is especially helpful where the expansion valve is frozen and it is desired to quickly and thoroughly dry the refrigerant to get the system back into operation with a minimum of delay. This can be done by installing the drier in a by-pass, as illustrated in Fig. 7. If desired, the inlet end of the drier may be connected directly to the liquid receiver valve and the outlet side of the drier to the gauge port on the suction line service valve connection. The suction line service valve should be open and the valve controlling the flow to the drier should be cracked, just so you frost all the way through the drier and not into the machine. Keep the machine operating so that refrigerant is circulating and being dried. Then thaw out the expansion valve. Dry refrigerant will flow through the valve, pick up the moisture, and bring it back until it eventually is dried in this by-pass arrangement.

The by-pass arrangement may be left in permanently for future use or it may be removed, as desired. The by-pass arrangement makes a splendid installation for large capacity systems, since at the time of installation the system may be dried, the valves closed, and the

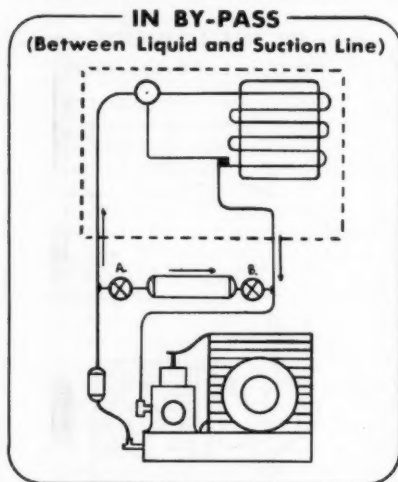


Fig. 7—Open valve "B" and crack valve "A", regulating it until entire drier is frosted.

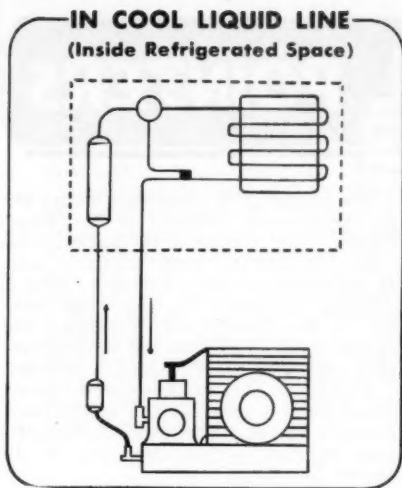


Fig. 9.

drier left in for subsequent use at some later date if the system shows a tendency to freeze up or gives any other indications of moisture.

If low side application of the drier is impracticable because of certain space limitations, the next best location of the drier is in the liquid line between the heat exchanger and the evaporator, as shown in Fig. 8. The liquid, having passed through the heat exchanger, is chilled below normal liquid line temperature, and while the drier is not as efficient as the lower temperature low side drier, it is more efficient than if it were installed in the hot liquid line outside of the refrigerated space. So, when a low side drier is impracticable, this installation is recommended.

Fig. 9 shows the drier located in the cool liquid line inside of the refrigerated space. If the heat exchanger cannot be used, then this is the next best location, although it does tend to heat the refrigerated space because of the large exposed surface of the drier. It is preferable to get the liquid line in contact with the suction line to chill the liquid as much as possible before it enters the drier because the lower the liquid and drying agent temperature the higher its efficiency. That is the thing we desire to remember.

Reno Grocery Store Installs Own Ice-Making Equipment for Produce Display

REFRIGERATION of a quite different nature has been applied to produce merchandising at Sewell's, huge new 30,000 square foot supermarket recently completed in Reno, Nev., to build up a sales volume in fresh and dry vegetables of more than \$5,000 per week.

The produce department is equipped with one 66-foot dry rack, finished in pastel porcelain, and a 44-foot fresh vegetable rack which is refrigerated with crushed ice.

Produce as received from refrigerated trucks is brought into an 18x20 foot processing room, where six stainless steel sinks are utilized for washing it, culling off bad sections, and stacking the vegetables in lugs. The produce then moves into a 20x20 foot walk-in refrigerator, constructed by the Refrigeration Engineering Company of Los

Angeles, to completely eliminate spoilage. The cooler is equipped with three overhead coil-and-blower units, powered by two 5-hp. Mills compressors, and any two of the units are sufficient to keep the room at a perfect 45 degrees.

Also powered by the two Mills units is a package-type ribbon-ice machine, which produces approximately a thousand pounds of chipped ice per day. Fresh produce on display is iced four times daily, from a stainless steel, rubber-tired cart, which moves ceaselessly up and down the display. Artistic effects, such as flags, seasonal themes, etc., are worked out with beds of ice, in which vegetables are imbedded. Customers appreciate the ice far more and there is absolutely no spoilage, according to Glenn Harris, manager of the produce department.

SERVICE

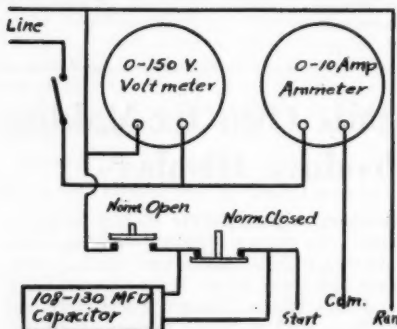


POINTERS

A department for the exchange of ideas on new devices and methods of improving service work. Five dollars is paid for each pointer published. Write up your idea today and mail it to the Service Pointer Editor.

HERMETIC TESTER

HERE is a hermetic starter and tester which I made up out of about ten dollars worth of surplus parts and a couple of hours time. The instrument incorporates, in a box about 8"x6"x4", facilities for checking line voltage, voltage drop when starting, current draw, as well as a means for starting hermetics with or without capacitors in the starting circuit.



The accompanying diagram explains pretty well the electrical hook-up. The parts used, however, might need some explaining.

The push button assembly is standard on many magnetic motor starting switches. I got mine from a junked Square D. The "start" button contacts are normally open; the "stop" button contacts normally closed. The circuit breaker switch was found in the junk back of the shop. Only had to buy the 6 amp. heater for it. Meters, meter box, and clips will be found advertised as war surplus items in any issue of Radio Craft magazine.

The capacitor is connected across the normally closed contacts of the "stop" button. For starting units that have no capacitor, only the "start" button is used. If a Crosley or other hermetic using a capacitor is under test, the "stop" button is held down, which throws the capacitor in series with the starting circuit; then the "start" button is pressed.

This instrument has been a real time-saver for me, especially where a combination of relay and capacitor trouble was involved.—Submitted by H. L. Myers, San Diego, Calif.

★ ★ ★

USE A DENTIST'S MIRROR

HERE are two small service pointers that have helped me in my work at various times. The first is an ordinary dentists' mirror. This mirror magnifies slightly and is set at an angle from the handle. I often find it useful in locating leaks in brazed joints that are in almost inaccessible places such as in the unit housing of an ice cream cabinet or the pipes connecting the plates in a standard household evaporator. Also I find it useful for reading belt numbers and motor numbers when the position of these makes reading normally impossible without removal.

The second pointer concerned an unusual incident that occurred to me when shifting a milk cooler. The unit was a ½ hp. Frigidaire, F-12 refrigerant. During the war the machine had been converted to methyl chloride. After fitting up the aerator and replacing a faulty expansion valve I recharged the system with F-12. Then the fun began. Instead of bring the milk down to 40 F. I could not bring the back pressure low enough to obtain a temperature lower than 52 to 55 F. The machine had been idle for some 12 months but when it had been in use it had worked quite well. One peculiarity I noticed was that the back pressure would rise far too high while setting it. By this I mean that although there was only a trickle of

milk flowing over the aerator, the temperature of that milk would rise if I shifted the adjustment to allow more, or less, refrigerant through. The compressor checked 100%. All lines were renewed and a large dehydrator placed in the liquid line for several days showed only slight traces of moisture.

In the end the head of the compressor was removed, with the intention of renewing the suction and discharge valves. However, the cause of the trouble was that the filter in the suction port had been removed entirely and a carbon sort of deposit was choking the port—thus restricting the flow of gas. Once this fault was remedied and the filter renewed, the machine operated as good as new.—Submitted by S. Roberts, Auckland, New Zealand.

★ ★ ★

REPAIRING RELAY POINTS

THE starting points on G.E. relays which are burnt can be replaced very easily, saving time and money.

I grind off the starting points from the worn switches of split phase motors and file them smoothly. By filing off the burnt starting points on the relay, the filed points from the worn switches can then be soldered in place. Care should be taken that no solder is on the face of the points as it may cause the points to stick.—Submitted by Alfred Goldstein, Brooklyn, N. Y.

★ ★ ★

CURRENT CONSUMPTION OF MOTORS

MANY servicemen find it difficult to figure the cost of electrical consumption of motors on refrigerators, so to help us in our explanation of the subject let us assume we have a 1/16 h.p. motor, such as used on the smallest Frigidaire Meter-Miser unit. Referring to tables, we find that 1 hp. is equal to 746 watts per hour. This figure, of course, is theoretical and does not take into account the loss of efficiency, and since most motors are only about 70% efficient, we will therefore have to add 30% to this quantity to get our actual electrical consumption per horsepower, which will then become 1.30×746 , which equals approximately 970 watts. 1/16 of this amount, which would be the con-

sumption per hour for 1/16 hp., would be approximately 60 watts.

There are 30x24 hours or 720 hours per month in which the machine will have to refrigerate, and since it will run only about 25% of this time, our total running hours will be 25/100 of 720 which equals 180 hours per month. Multiplying this by our watts per hour, we obtain 60×180 which is 10800 watts or 10.8 kilowatt hours per month. From the local electrical company you can obtain the cost per kilowatt hour, and if we assume this to be 5½¢, our cost then becomes 10.8×5.5 which equals 59.4¢ per month.

The whole matter can be boiled down to a simple formula, which could be stated as follows:

$$\frac{1/16 \times 746 \times 1.3 \times 180}{1000} = \frac{174.5}{16} = 10.9 \text{ kilowatt hours per month.}$$

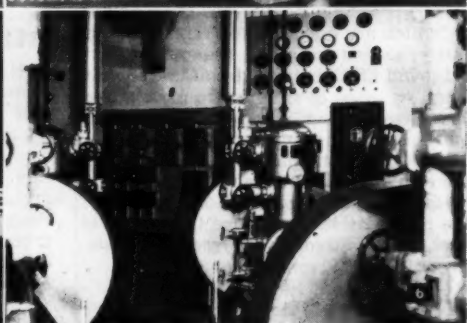
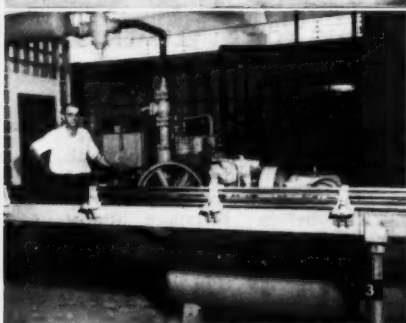
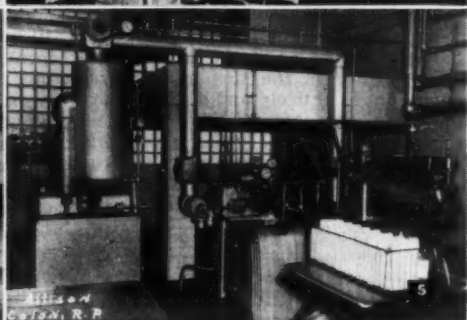
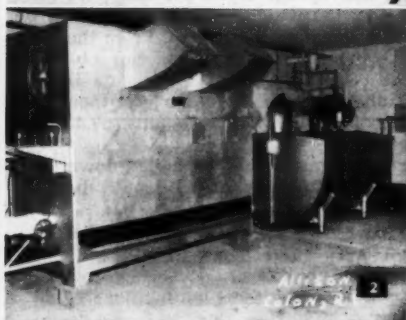
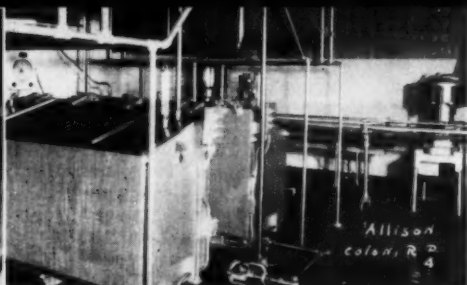
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REPLACING POWER ELEMENTS

I HAD occasion to change power elements or control bulb on a refrigerator thermostat and found the bellows expanded so much I was unable to reassemble. I took a piece of porous cloth like toweling, dampened it, wrapped around the bulb and sprayed it with Freon. The bellows collapsed almost immediately and the assembling was easy.—Submitted by H. K. Danielson, Parkston, S. D.



"Air-conditioning is invigorating, isn't it?"



Refrigeration Plant In Latin America

L. E. EDWARDS, Refrigeration Engineer and member of RSES in the Canal Zone, provided the above pictures as an example of what he and his crew are accomplishing in Latin America. The installation shown here is an ammonia system recently completed in a milk and ice cream processing and carbonated beverage plant. Mr. Edwards, standing right (Photo 1), and his men who are natives of various Latin American countries, made the entire installation with the exception of the insulation, tile and painting.

Other pictures in the group show:

(2)—the milk storage room held at 38-42 F. Equipment includes a Frick chilling unit, liquid level float control, a manifold equipped with Hubbell combination back pressure valve and stop valve operated by a Minneapolis-Honeywell thermostat.

A Cherry-Burrell 600 gallon storage vat, operated by an Alco valve and back pressure valve maintaining constant pressure on expansion coils.

Flexo-Flo milk transfer pump from vat to pasteurizer in process room.

(3)—In this picture with Mr. Edwards, is a 40 hp. Carrier condensing unit and

evaporative condenser serving a Liquid Carbonic Cascade cooling unit for a 40 spout filler. Water at the leads in the filler is maintained at 38 degrees. A soaker is shown in the rear and a Worthington clutch operated air compressor in the foreground. The compressor serves air clutches on the soaker and filler.

(4)—This is the milk end of the processing room in which in the background, filler and conveyors are shown. In addition, the picture shows two 200 gallon pasteurizers with Sentinel control. Flex-Flo milk transfer pump is located between the pasteurizers. A battery of surface coolers is shown overhead, in which the top section is cooled by city water to 75 degrees. Atmospheric spray tower keeps this water to the temperature required. Bottom section of the surface coolers is held at 33 degrees by sweetwater from the water chilling unit. This equipment handles around 3,000 lbs. of milk per hour at the present time.

(5)—Ice cream end of the processing room. Equipment shown here is a 12 mold brine tank, 60 gallon continuous freezer, 40 gallon batch freezer, 150 gallon aging vat shown overhead in background. The mix is pasteurized and cooled on the second floor of the building and drops by gravity to the aging vats.

(6)—A view of the compressor room and the control panel. On the control panel shown in the background are indicating Taylor thermometers for the various rooms, a two-speed Mercoid control for the two-speed compressors and the electrical switches for the various motors. The entire panel was fabricated on the job by a native welder. Compressors in the room, all of which are not shown in the picture, include a 5 x 5 two-speed machine serving the milk storage room, a water chilling unit, a 600 gallon storage vat for milk, and a 150 gallon aging vat for ice cream mix. This machine operates at 35 lbs. back pressure and 170 lbs. head pressure.

Three other machines are 5 x 5 single-speed machines serving three ice cream rooms, an anti-room, a 60 gallon continuous freezer, a 40 gallon batch freezer, and 12 mold brine tank for freezing pop-sicles. All of these compressors are Frick equipment.

Streamlined System Saves Labor, Protects Equipment

By BERT MERRILL

A NUMBER of unique features in food-storage refrigeration which do away with much of the labor connected, protect all refrigeration equipment against floods and other damage, etc., are included in the beautiful new Clark's Restaurant, recently completed in South Bend, Ind.

The huge restaurant, one of the largest in the state, was "built new from the ground up" by Daniel Clark, owner, following a disastrous fire which destroyed a former food service institution. One of the first things Mr. Clark did was to make the restaurant as "self-supporting" as possible, including its own artesian well, its own electrical generating plant, refrigeration repair shop, etc. Barring major disasters such as earthquakes, hurricanes, etc., Clark's Restaurant can go on operating serenely, even though power failures, water shortages, etc., may occur in the municipal systems.

Twenty-one Refrigerators

Twenty-one walk-in, reach-in and storage refrigerators of various types are located through the street-level in the restaurant, including Chef box, produce refrigerator, dairy box, a meat refrigerator, dry bottle boxes, salad refrigerated compartments, etc. All of these are connected to a single-purpose "refrigeration room" in the basement.

Located in the basement is a zero-temperature cold storage plant, with capacity for more than a carload of frozen foods, a 25-below-zero quick freezing unit that will handle more than 2500 pounds of food per day, either in making up "advance inventories" of popular food specialties, or in quick-freezing and saving leftover surplus. Ranged around these two low-temperature boxes, both of which are cork insulated, provided with individual Solenoid thermostats for precise control, etc., are a series of refrigerators for various types of food, all built into "one single unit".

Feeling that much refrigerative capacity is wasted where a series of small

walk-in coolers are used, Mr. Clark designed one single large storage box, 41x8 feet, which is provided with four walk-in doors, and six reach-in doors. Foods under refrigerated storage are stocked according to the frequency with which they are needed. Thus, whole carcasses of meat, cheese "wheels", etc., are stored in the 41x8 foot cooler behind the walk-in doors, while smaller cuts of meat, dairy products, dessert ingredients, etc., are stored behind the six reach-in doors. The refrigerator is provided with special germicidal lamps throughout, and by maintaining a single 38 degree temperature overall, the storage cooler gives perfect food preservation. Chefs may accumulate all of the ingredients for a meal at once inside the huge refrigerator, by walking from shelf to shelf, or rack to rack—without going through the laborious process of opening one heavy door after another, such as is usual restaurant practice.

All of the condensers, water savers, compressors, etc., are located in a single room, 75x25 feet, in the south end of the restaurant basement. Here, all small compressors, ranging from $\frac{3}{4}$ horse power to $2\frac{1}{2}$ horsepower are strung out along the wall, spaced 3 feet apart, and are mounted on a 12-inch concrete ledge, 3 feet broad, which forms a "base" on the wall. The 12-inch ledge holds the compressors sufficiently high that the basement may be hosed down and cleaned without damaging any of the mechanical equipment, and in the event of a flood, the water must rise more than 16 inches before there is any danger of damaging condensing units. Also, all gas and water supply lines to each condenser are sunk in the concrete itself, for greater protection, with individual outlets directly at the side of each machine connected to them. There are no "exposed pipes" whatever, and every condensing unit has 3 lines for supply and water return, and city water which may be piped in where the recirculative system fails.

All electrical connections, conduit boxes, junctions, etc., are mounted on the wall directly over the machine which they affect. This, to make repairs on any refrigeration unit, mechanics may switch off the entire circuit affected by simply opening up a panel directly above the machine, and throwing the proper switch.

Refrigeration equipment at the far end of the "refrigeration room" includes two air conditioning units, a shell-and-tube low temperature unit for the quick-freeze and zero storage boxes, etc. All units are numbered, with a diagrammatic chart of the refrigerators' service covered with plastic and mounted in a frame behind the machine on the wall. In the event that any reach-in or walk-in box in the restaurant breaks down, it will require only a few seconds to isolate the trouble.

★ ★ ★

LOWER TEMPERATURE MEANS QUALITY FOR VEGETABLES

IF PREPACKAGED fresh vegetables are kept at a temperature of 42 F during marketing operations they will keep from two to three times longer than if no attention is given to refrigeration, say transportation and storage specialists of the Bureau of Plant Industry, Soils, and Agricultural Engineering, of the U. S. Department of Agriculture.

Most recent evidence they have on this score comes from a study conducted with funds from the Research and Marketing Act in which broccoli, brussels sprouts, and cauliflower were wrapped in various types of transparent film shortly after they were harvested. Then they were tested under market conditions. One batch was held at 67 F, which approximates store room temperature in the average market during fall and winter months. Another batch of the vegetables was held at 42 F, which is about the temperature of the ordinary home refrigerator. Non-wrapped lots were also tested at these two temperatures.

Results showed that some types of plastic wrappings are more satisfactory for fresh vegetables than others. All of the wrappings afforded some protection of quality. The non-wrapped lots lost weight rapidly.

The widest variations in quality, however, resulted from differences in temperature at which the vegetables were held. At 67 F none of the prepackaged vegetables was salable after 4 days. But at 42 F the packaged cauliflower remained fresh in appearance and satisfactory in flavor for 8 days. And the brussels sprouts and broccoli remained in a salable condition for 11 days.

QUESTIONS



ANSWERS

The following are more of the questions and answers discussed during the "Information Please" sessions at the annual convention in Cleveland.

DIRECT EXPANSION MILK COOLING

QUESTION: At what back pressure should a ten hp. Freon-12 machine operate in cooling milk over an aerator for most efficient handling. The aerator is direct expansion with sweet water cooling top section.

ANSWER—By Al Schmitz: We all know that if we reduce milk down to a point below 32 F., we freeze out some of the solids. So the important point is to run a refrigerant temperature through the direct expansion section somewhat above 32 F. The field recommendations, as far back as I can recall, on direct expansion sections have been somewhat above 33 degrees. That would be the low limit of the refrigerant temperature that would be flowing through the direct expansion section. Now, 33 degree refrigerant is approximately 30 to 33 pounds. That is the corresponding pressure in the direct expansion section. If you have a condensing unit that is located some distance from the direct expansion section, it is entirely possible that the pressure at the compressor may be somewhat lower due to a pressure drop through the direct expansion section. The important point would be to maintain a refrigerant temperature and corresponding pressure of not less than 31 pounds at the direct expansion section.

Some of the installations, especially involving condensing units of that size, have installed a suction pressure regulating valve in the suction line beyond the outlet of the direct expansion section. That type of control valve usually has a fitting on it so that you can install a gauge, and it would be to your advantage to maintain about 31 lbs. pressure in the evaporator at that point to pre-

vent the milk from freezing on the direct expansion section.

QUESTION: My experience has been, on direct expansion aerators, that you have anywhere from a 6 to 10 lb. pressure drop through the direct expansion section because of the construction of the lines and you will find that your actual pressure reading at your suction valve on your compressor will be somewhere around 24 to 25 pounds.

ANSWER—By Al Schmitz: I'm glad you brought that up—about design conditions—because that is one of the bad features of the serpentine type circuits of direct expansion sections. Many of the manufacturers of aerators have come to realize that pressure drop is an important factor.

As an example, let's say that we have 10 horsepower at a given suction pressure. If we have 6 pounds pressure drop through the evaporator and possibly 2 or 3 pounds more in the suction line, the pressure at the compressor is going to be considerably lower than the headline of 31 pounds. If it is run at 18 pounds we are not going to get the full capacity that we would if it were running at 31 pounds or thereabouts, because the capacity of a condensing unit does drop with a drop in suction pressure. Some of the direct expansion people have recognized that and have changed the circuits. They have run them in series, parallel circuits, to break up the pressure drop through the direct expansion section.

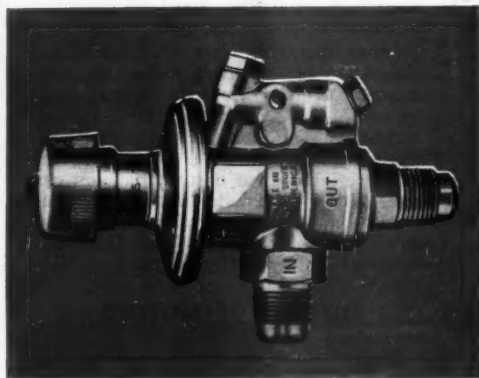
I think it is an important point, especially for those interested in that type of work, to determine the application. You may be called in on an existing job—you may be the new service company that is to take over the responsibility of maintaining that particular application—and I believe that one of the first things that you would want to do would be to analyze the application and see whether the installer, the original seller of the equipment, really engineered the

ing temperatures with one condensing unit. The new Check Valve is installed in the outlet line of the lower-temperature evaporator. The back flow of gas from high to low temperature. Must be used for proper operation of the Check Valve. For service design and construction features make the new A-P for bulletin No. M-200, or new condensed catalog.

INDISPENSABLE . . . FOR MULTIPLE SYSTEMS
DEPENDABLE Model 235-S
SUCTION PRESSURE REGULATING VALVE



A-P Model 235-S is well-known for its ability to provide faster, closer, more accurate control of evaporator pressures on multiple systems. Maintains constant pressure regardless of load change. Can be adjusted to system immediately, with adjusting knob and graduated visible scale on collar. No waiting for system to settle down. Capacity, up to 1/2-ton Freon, 3/4-ton Methyl or Sulphur. Pressure adjustment from 0" vacuum to 40 lbs. At your wholesaler — or write for bulletin M-110, or new condensed catalog.



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job properly. There is no point in going out and bating your head up against a brick wall. If you have a half horsepower machine and the load conditions call for a one horsepower machine, that should answer your question.

TESTING FOR LEAKS

QUESTION: We have a dairy plant using calcium chloride brine as a medium and Freon-12 as a refrigerant. About every six months we have to recharge. We have tested all joints with a torch and even put in Trace, but cannot find the leak outside of tank. Would it be possible to take a sample of brine, place it in a test tube and heat it up, thereby vaporizing any Freon-12 and using a torch for the test? Is there any fluid comparable to Nessler's reagent, that we are using on ammonia, that would find traces of methyl chloride or Freon-12 in a fluid?

ANSWER—By Dr. W. O. Walker: In commenting on the question as to the method of testing for Freon-12 or methyl chloride in a brine which has absorbed it, let me tell you that years ago we worked out a technique for doing that. All you have to do is heat the brine, or heat the water that the suspected refrigerant is in, and it will boil off quite readily and can be detected if you hold an ordinary halide torch up against the issuing steam. Ordinarily, you will get the refrigerant off far below the boiling point of water. If you leave your name with me I would like to send you the publication of the Ansul Chemical Company on that particular matter.

As far as I know there isn't any chemical similar to Nessler's solution. Nessler's solution is a chemical compound which will detect extremely small traces of ammonia. There isn't a chemical which will detect the presence of Freon-12. If you put tracer materials in either methyl chloride or Freon-12, there is a possibility of locating a leak, but none of those tracing materials have been too satisfactory. If the leak is suspected to occur someplace besides the vicinity of the brine system, four or five percent sulphur dioxide could be put in the machine along with the Freon-12, and then you would be able to make an ammonia test for leaks. The Freon people do not recommend this procedure.

QUESTION: While putting one of the coloring materials such as Trace in the system we had a very interesting experiment. One of the companies brought a glass evaporator to one of our chapter meetings and in order to show us what was happening in the glass evaporator, he put in some Trace in order to dye his refrigerant. It started through all right, but suddenly it all disappeared. He put in some more and that gradually disappeared. We took off the silica gel drier and apparently that was where the trace was going because when we by-passed the drier, the Trace stayed in the system. I had used Trace several times and never found a leak by it, but the systems that I used it on all had silica gel driers.

ANSWER—By Dr. W. O. Walker: Years ago, before Trace even appeared on the market, there was another product similar to it in composition that we found could make the prettiest little rubies by putting together silica gel, Freon-12 and the color tracing material. Letting those stand together, the color fades very rapidly and all of the color is absorbed on the surface of the silica gel. I have in my desk a tube full of silica gel which is a beautiful ruby color. It has been there about eight or ten years and the color is still there. The curious thing about it is that this phenomenon seems to occur, to its greatest extent, in Freon. It occurs slowly in methyl chloride, but it seems to be characterized, particularly, in Freon-12 and silica gel.

Other manufacturers of these materials knew of this thing years ago. One manufacturer, years ago, warned that he could not guarantee, after a certain number of months, that the material would remain effective. It is just one of those oddities of nature that you run into, and you have to take it into consideration if you are going to use these materials which, after all, do have considerable value if used right.

OUTPUT OF MOTORS

QUESTION: Assuming the electric motor is okay, is it possible to take current ratings off of the motor name plate, or take current readings of the motor by an ammeter and determine the output of the compressor for either a 110 or 220



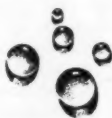
COOLS



DEHUMIDIFIES



HEATS



HUMIDIFIES

It delivers January in June



...and June in January!

Whether Nature makes the air too hot and damp, or too cold and dry... Marlo will make it just right for you. These Air Conditioning Units completely process your air: (1) **Filter it**; (2) **Cool and dehumidify it**; (3) **Heat and humidify it**; (4) **Circulate it**. They're designed to be useful every day in the year... and quality-built in every detail to stand up under day-in, day-out service.

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Marlo AIR CONDITIONING UNITS

MARLO COIL CO. / ST. LOUIS 10, MO.

single phase or three-phase motor? Are there any prepared tables or data from which to work?

ANSWER—By G. Clark: It just happens that some of our boys have just run some tests on motors. We find that on the motor rated, for instance, for 7.2 amps. at full load, the motor develops just exactly its rated horsepower at that input. However, the load is not proportional to the ampere input of the motor by any means, because on any alternating current motor the wattage is equal to the volts, times the amperes, times the power factor, and the power factor varies from a low of 20% up to a high of 70%. When you start the motor out, to test it, you find a certain ampere input. As you increase the load on the motor over a range of possibly 25% of its rating, you find a very small ampere increase in the input of the motor. Consequently, it is not possible to tell the motor output from the ampere input. When the motor gets up to its rated amperes you can find the output.

Comment By P. B. Reed: I might add just a little to that. Some of the manufacturers do put out tables showing not only the Btu. per hour capacity of their condensing units at the various evaporating temperatures and suction pressures, but they also show the wattage. If you are checking a given make and size of condensing unit and have that manufacturers data on the wattage, at the suction pressure that it is operating at, then it would be a fairly good indication as to what your capacity was.

Comment by T. Lopiccola: I would like to add something to that. In that comment you have assumed that the motor is good, but you also must assume that the compressor and unit drive is good. If you have tight belts, or possibly have a defective compressor, your motor-load draw would necessarily be higher and as a result you might show a full-load condition on the motor without full output on the compressor.

Comment by A. F. Sawyer: I haven't done any work on the motors for some time, but I am one who likes to carry a lot of rules-of-thumb in my head. As I recall, we used to use watt meters and figure that a one hp. motor would take about a thousand watts and a half hp. motor would take about five hundred

watts. Most of us remember, seven hundred and forty-six watts per horsepower and the rest of that is taken up in losses in the motor. You may wish to try that sometime. I think you will find it easy to use—easier than an ammeter.

Comment by P. B. Reed: That is a good round figure—a thousand watts is pretty close to being right for the average small motor, the fractional horsepower motor. I think it might be well to add that although a thousand watts is approximately a horsepower, at around sixty-five percent efficiency of the motor, most of the manufacturers of condensing units are rating their condenser units at not full-load rating of the motor, but usually all the way from twenty to forty percent overload. So most of your condensing units are rated not at full-load of the motor, but twenty to forty percent above that. If you check up a motor and it is a one horsepower motor and it is running thirteen to fifteen hundred watts, don't be at all surprised because that is probably normal for it.

SUCTION LINE SIZING

QUESTION: In one of our big chain outfits they have a fifty-foot open display case and are using a 1½ hp. Lippman Freon unit. This fifty-foot display case has a 1½ inch suction line which comes down and up over a door and then back down around, hooking into the compressor with two ¾ inch suction lines. They "T" off at the valve, drop down, make a "T" and go into the big Lippman. There is no oil trap on this of any kind and you can count the spokes on the compressor, it is going that slow.

My curiosity has been—how in the world are they going to return the oil back into the compressor with a 1½ inch line without any velocity? They have no velocity because they have no speed.

ANSWER—By P. B. Reed: There are one or two features to that job that I would like to comment on. One is that the rpm. in the compressor is not necessarily an indication of the velocity of the gas coming back in the suction line. You might have a high capacity in that compressor and a high velocity of the gas in the suction line, and still have a slow speed compressor. If you operated that

separate controls...



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—you can change the superheat setting of the
ALCO Thermo-Limit Valve without affecting
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frigerator Pressure Regulators; Solenoid
Valves; Float Valves; Float Switches.

same compressor at a higher rpm., the velocity in the suction line would be higher. But it wouldn't necessarily be true that the velocity at your given rpm. of the compressor is not high enough to cause the return of oil.

Your statement that there is fifty feet of open case on a $1\frac{1}{8}$ inch suction line certainly leads one to believe that there must be quite a pressure drop in that suction line. As a matter of fact, if a $1\frac{1}{2}$ hp. unit is carrying fifty feet of open case on a $1\frac{1}{8}$ inch line, that is quite a lot of capacity to be carrying on a $1\frac{1}{8}$ inch line. As a result, the velocity of your gas in that $1\frac{1}{8}$ inch line would normally be a great deal higher than it would be if that suction line were even bigger, or, let us say, as big as it should be. So your small suction line would tend to cause the velocity to be higher and your oil return even better than if the suction line is large.

That, perhaps, explains why they do

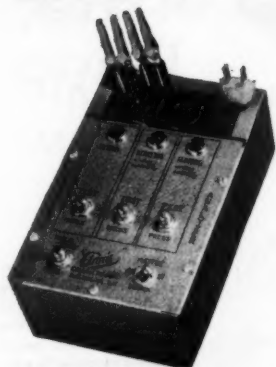
not seem to be perturbed about running it over a door. If you have a good, high velocity it will carry the oil along. I have run suction lines in a way that would make the old Frigidaire man's hair curl. It was almost necessary, in the days of SO_2 systems, that the lines be sloped gradually toward the compressor because the return of oil was dependent upon the slope of the suction line. Then, when the oil-miscible refrigerants came along they picked up the oil and carried it right along with the refrigerant. You could wind the suction lines up over doors and down underneath sills, and things of that sort, that you couldn't do in the sulphur days. Those of you who did work with sulphur, in commercial equipment, and then went to the methyls and Freons, undoubtedly found that you were able to lead your suction lines around places, and around corners, that you couldn't possibly do with the non-miscible refrigerants.



Students of the North Dakota State School of Science, shown hard at work in the school's refrigeration shop, upper photo, spending their first nine months of training preparing for service work in the domestic field. Much of this time is devoted to the Physics of refrigeration, compressor characteristics and refrigerant controls. During the second nine months, commercial and industrial refrigeration and relating subjects occupy their time. Students are required to make heat calculations, specify size and speed of compressor, size of motor and running time. After all calculations are made, an actual installation is completed and calculations then compared to actual results obtained from recording instruments.

Students also learn the servicing and repair of all types of electric motors in the motor repair shop pictured below. Refrigeration is only one of the eighteen courses offered at this State School of Science, which has a total enrollment of 900.

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SPECIFICATIONS
Size: 3" x 5" x 8"
Weight: 1 3/4 pounds
Price: **\$16.50**

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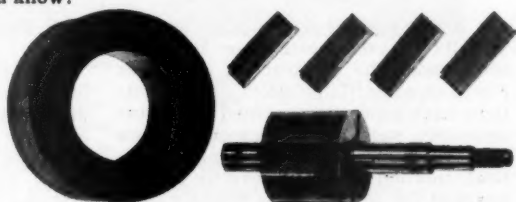
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Stuck units can frequently be freed by reversing the running direction.

ACCURATE—you can estimate closely without fear of having to take a loss. A "must" in any repair kit. Be sure you have it. Don't be embarrassed by your customer asking: "How do you know?"

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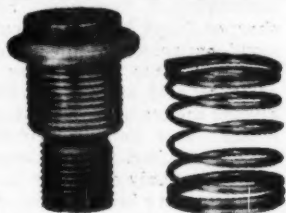
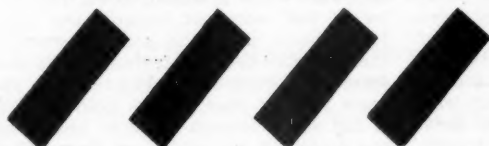
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71

June, 1948

Subfloor Ventilation Prevents Frost Heavage



Artwork by the makers of Armstrong's Insulation.

★
Frost build-up underneath the improperly laid floor slab of this freezer buckled the walls and floors, causing the complete breakdown of cold storage facilities. Sub-floor ventilation offers one simple solution to this problem.

FOR many years the problem of frost build-up underneath floor slabs has complicated the construction of freezer rooms on or partially below grade. Solutions have generally consisted of evasive measures, such as the suspended floor slab type of construction. A more practical solution, striking directly at the heart of the problem, has recently been set forth in a simple set of construction specifications worked out by engineers of the Armstrong Cork Company.

The whole problem of subfloor frost accumulation has been brought into sharper focus in recent years with the rapid expansion of the frozen food industry. In the past, upper floor levels of large cold storage warehouses were always the traditional location of freezer rooms. But today, community locker plants and food freezing centers are almost invariably one-story buildings with no alternative but to utilize ground level floor space for the location of freezer rooms.

In some instances, where subsoil drainage is good and the dimensions of the plant are small, the construction of freezer rooms on grade has proved entirely satisfactory. Other plants have not been so fortunate.

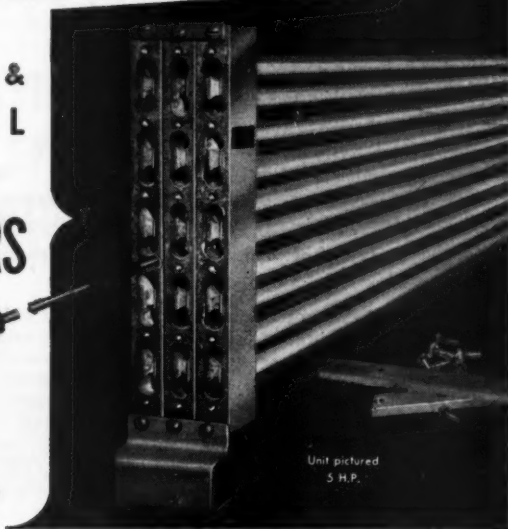
Frost Accumulation Slow

Frost build-up underneath floor slabs is slow and methodical; it does not take place overnight. Over sustained periods of operation, freezer rooms draw heat from the ground through the floor slab faster than the ground heat can be restored by natural forces. No amount of insulation can prevent this flow of heat from the subsoil, through the concrete floor slab, into the freezer room. For insulation does not prevent the passage of heat, it serves only to retard the flow of heat.

Frost in the ground underneath the floor slab works gradually from the center of the room out towards the wall foundations, until the soil underneath the floor slab becomes frozen solid in the form of a huge cone. Frost builds up from year to year, to the point where it can exert enough force to heave up the center of the cold room floor. This condition may first be noticed when compartment doors on frozen food lockers begin to stick and warp. As time goes on, cracks appear on the floor slab, and extend like jagged fingers up the walls. With continued heaving of the floor, walls will bulge and rupture. The

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Unit pictured
5 H.P.

HM units combine two features never before obtainable in tube-within-a-tube water-cooled condensers; (1) They're **CLEANABLE**. the water tubes are easily accessible at both ends for the spiral cleaning tool to restore the interior water surfaces to "new-unit" efficiency. (2) A **TRUE-COUNTER-FLOW** relationship is achieved between the coolant and the refrigerant through a unique seamless copper tube-within-a-tube construction that makes obsolete most-types of similar water-cooled condensers. Thus, water and space requirements are reduced substantially and a most economical operation is obtained.

Seamless Copper Tubes
Brass Headers Machined and Brazed

*HM Condensers available
from 1/2 to 10 H. P. from
wholesalers in principal cities.*



Halstead & Mitchell

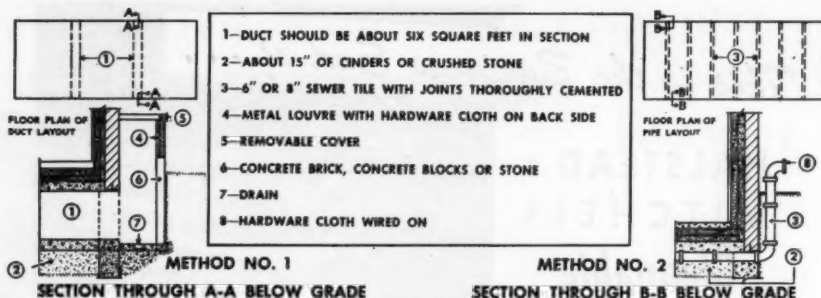
OFFICES: Bessemer Building, Pittsburgh 22, Pa.

Look for the N-E-W

Halstead & Mitchell
CLEANABLE WATER CHILLER

Soon to be Announced

38° F. WATER with SAFETY



Photograph by the makers of Armstrong's Insulation.

Sectional view of method of constructing ventilating tunnels or of laying sewer tile under floors of freezers.

ultimate result of this unfortunate situation is the complete breakdown of cold storage room facilities.

Ducts Provide Warm Air

The most practical solution to this problem is to ventilate the soil underneath freezer room floors with a system of air ducts, constructed in accordance with these specifications. Spaced at regular intervals, these ducts introduce sufficient warm air to keep ground temperatures above the freezing point, thereby preventing the formation of frost.

Ducts can be constructed either as concrete tunnels or with terra cotta sewer tile. Both types should be laid across the short dimension of the floor to allow for maximum circulation of air. Ends of pipes and tunnels should be covered with screen wire to prevent the entry of animals, insects, leaves, gravel, and other rubbish. There are two rules of thumb used in roughly estimating the construction of ventilating ducts: 6 or 8 inch pipes are laid on corresponding 6 or 8 feet centers; six foot square tunnels are constructed on approximately 16 foot centers.

Naturally, there are various factors which have a direct bearing on the design of freezer rooms on or partially below grade, and the use of subfloor ventilating ducts. Soil composition, drainage, climatic locale, and floor dimensions should all be taken into consideration. Maximum dimensions of unventilated floors should not exceed 20 by 20 feet. These dimensions are calculated on the

basis of a theoretical assumption of average soil and drainage conditions. Under such conditions, natural heat from the sun and earth will penetrate the ground underneath the freezer to a distance of about ten feet from the outside walls.

Other Methods of Preventing Frost

Prior to the release of these specifications for subfloor ventilating ducts, it was the general practice to suspend floor slabs just off the grade to allow for a subfloor air space. Whenever it was absolutely necessary to build freezer rooms on or partially in grade, it was always recommended that good drainage be assured by a substantial fill of crushed stone and cinders.

Experiments aimed at frost prevention



Sewer tile used on sub-floor ventilation and opened to the atmosphere at the side of the building is covered with wire mesh to keep out leaves and other accumulation.

Photograph by the makers of Armstrong's Insulation.

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for Maximum Service!**

Electromatic NON-REFILLABLE DRIERS



TYPE ND 2

All Brass-Copper Construction for Long Life

Advanced design makes these Electromatic Non-Refillable Driers remarkably efficient! All-brass ends are soldered to all-copper tubing. Inlet screen bound with brass ring is 50x40 mesh brass. Outlet is 100 mesh monel screen plus a pure white wool felt disc of refrigeration quality which acts as a highly effective strainer. Filled with dust-free refrigeration grade Silica Gel. Every drier is pressure tested twice!

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have also been made with various methods of introducing artificial heat underneath the floor slab, such as electric coils or a grid of warm pipes. All of these alternatives generally involve substantial installation and maintenance

costs. A practical system of ventilating ducts, written into specifications while the job is in the design stage, is a simple and inexpensive form of insurance which will pay big dividends on the future carrying costs of lockers and freezers.

N.A.R.C. ACTIVITIES

THE national officers of the National Association of Refrigeration Contractors sat in conference in Chicago recently with R. J. Thompson, Chief Engineer of Kinetic Chemicals and discussed for several hours the details of the "Freon" situation.

Mr. Thompson was emphatic in his statements that both raw materials and production are adequate for this year and will provide sufficient "Freon" for the refrigeration industry if the small cylinders to ship it can be obtained.

Kinetic Chemicals has over a quarter of a million 145 pound cylinders out and 72,000 new ones on order.

In the month of March, shipments were curtailed for the lack of cylinders. During April, return of cylinders improved, perhaps due to publicity given this serious bottleneck, and at the present time, shipments are going out at an increasing rate.

N.A.R.C.'s Board of Directors' meeting in Chicago on May 16 and 17 at the Stevens Hotel discussed and considered several topics. Among them was the present international situation and how the draft plans will affect labor.

A resolution was also adopted by the Board advocating licensing codes in all areas where locally applicable and that N.A.R.C. will participate in the formation of such licensing codes in direct cooperation with local associations in those areas.

N.A.R.C.'s directors likewise recognized that there is "still a labor problem and N.A.R.C. stands ready to actively assist local groups in their problems."

★ ★ ★

BALTIMORE JOINS N.A.R.C.

AT A recent meeting held in Baltimore, the Maryland Association of Refrigeration Contractors, Inc., formally applied for affiliation with the National Association of Refrigeration Contractors and were presented with a certificate of membership.

Attending the meeting were over thirty-five contractors from Baltimore and the surrounding area.

Ralph W. Lampie of Richmond, Virginia, one of N.A.R.C.'s officers and directors, as well as Eastern Division Membership Chairman, spoke on the need of strong membership and gave



In a recent meeting of the Refrigeration Contractors Association of Chicago, President E. S. Wright spoke briefly on the program of the national organization. Past President Warren W. Farr was also present for the meeting. The Chicago group has taken in nine new member firms in the last two months, according to President Hal Wheeler.

APPLIANCE TESTER



A genuine instrument for men doing refrigeration maintenance work, trouble shooting, or general field service.

So small and compact it can be carried in your pocket.

CHECK ITS MANY USES

- ★ Manual Test Relay for Refrigerator Motors.
- ★ Continuity Tester for Motor Windings.
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- ★ Makes Temporary Outlet Socket.
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The tester is shown here with heavy guarded clips attached to a hermetic unit.

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A simple, practical instruction sheet, which includes color charts for the most popular hermetics, is furnished with each tester.

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SERVICE ENGINEER

77

June, 1948

many pointers on conducting interesting meetings as well as building membership.

George Roche, Immediate Past President of R.E.W.A. and present as a guest,



Ralph Lampie presenting certificate of membership to Jack Ottenheimer, president of the Baltimore contractors' group. Officers pictured left to right are: Reese Nuckols, Director; Harry W. Goodhart, Secretary; Jack Frazier, Sergeant-at-Arms; Jack B. Ottenheimer, President; Aaron M. Aaron, Treasurer; K. C. Milford, Vice-President; Ralph Lampie, National Director; and Joe Helminak, National Executive Vice-President.

congratulated the group on their activity and assured them of cooperation from the wholesalers in helping them in every way possible.

This makes the 25th local association to affiliate with N.A.R.C.

★ ★ ★

FARM MARKET OUTLOOK

IN AN address by W. E. Saylor, manager, Rural Market & Utility Divisions, Kelvinator, on the "Farm Market Outlook from a Salesman's Viewpoint," he stated that according to REA, EEI, and Country Gentlemen Research Department estimates, 5,225,000 farms will be electrified by 1954—five years hence.

As a result of this electrification, again projecting the figures five years, through 1954, we arrive at expenditures to be made by farmers in order to utilize this service. The figures in the included table are pure estimates, as they necessarily must be, based on data supplied by rural engineers in connection with private utilities, public power sources, and Country Gentleman research department. You might call them pure guesses based on present saturation figures, mathematically extended. The accuracy of such estimates might be subject to variations in accordance with the amount of promotion put behind individual items, plus unpredictable economic conditions. No attempt has been made to place a dollar value on this merchandise except to estimate that the aggregate will total in excess of \$5,000,000,000. These items are merely a few taken from a larger list of some 500 possible applications of electricity in the farm home and on the farm, for the purpose of showing the possibilities.

In Use Today 1948 on 3,500,000 Farms	No. In Use	% of Satura- tion	Expected To Be in Use in 1954	% of Satura- tion	Units To Be Sold in This Period 1948-'54
Lights home		100%		100%	
Water Systems	525,000	15%	4,441,000	85%	3,916,000
Farm Wiring	1,175,000	50%	4,702,500	90%	3,527,500
Feed Grinders	140,000	4%	2,351,250	45%	2,219,250
Refrigeration	1,575,000	45%	3,918,500	75%	2,343,500
Home Freezers	192,500	7½%	2,090,000	40%	1,897,500
Milk Machines	175,000	5%	1,045,000	20%	870,000
Chicken Brooders	350,000	10%	1,567,500	30%	1,217,500
Washers	1,175,000	50%	4,180,000	80%	3,005,000
Milk Coolers	385,000	11%	1,306,250	25%	921,250
Irons	2,975,000	85%	4,963,750	95%	1,978,750
Cream Separators	525,000	15%	1,045,000	20%	520,000
Radio	2,800,000	80%	4,702,500	90%	1,902,500
Power Saws	35,000	1%	783,750	15%	658,750
Vacuum Cleaners	750,000	20%	2,090,000	40%	1,340,000
Ranges	350,000	10%	1,567,500	30%	1,217,500
Water Heaters	350,000	10%	1,828,750	35%	1,478,750
Small Home Appliances ..					\$1,000,000,000
Electric Motors	15,000	5%	2,612,500	50%	2,437,500
Corn Shellers	140,000	4%	793,750	15%	653,750
Hay Driers	8,700	¼%	156,750	3%	148,050

VIRGINIA MAKES FINE REFRIGERANTS

DON'T FORGET

"V-METH-L"

Methyl Chloride

AND

**"EXTRA-
DRY
ESOTOO"**

Liquid Sulfur Dioxide

THEY'RE

consistently pure consistently sure

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VIRGINIA *Refrigerants*

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COMING CONVENTIONS

New England States Association Conference and Exhibits

Place: Hotel Bradford
City: Boston, Mass.
Date: October 8, 9 and 10, 1948
General Chairman: John J. Madden, 212 Madison Street, Dedham, Mass.

11th Annual RSES Convention and R.E.M.A. Exhibition

Place: Sherman Hotel
City: Chicago, Illinois
Date: November 19-22, 1948
Secretary: H. T. McDermott, 433 North Waller Ave., Chicago, Ill.

Illinois State Association

Place: St. Nicholas Hotel
City: Springfield, Illinois
Date: September 25 and 26
Secretary: B. V. Clark, 612 N. May Street, Aurora, Illinois.

Committee on Cost Records—Earl Yockey, 209 Hinman Ave., Columbus 7, Ohio.

Committee on Parliamentary procedure—C. W. Neisel, P. O. Box 541, Corpus Christi, Texas.

Publicity Committee—Willis Stafford, Chairman, 332 S. Hoyne Ave., Chicago, Ill.

Regional REMA-RSES Conference Committee—Chas. C. E. Harris, Chairman, 2044 Massachusetts Ave., Cambridge 40, Mass.; A. L. Robertson, 402 W. Lakeside St., Madison 9, Wis.; Wm. J. Marshall, 105 Donegal Drive, Leaside, Ont., Canada.

Safety Committee—George J. Schuld, Sr., Chairman, 4596 Warner Rd., Cleveland, Ohio.

Trade Relations Committee—A. L. Robertson, 402 W. Lakeside St., Madison 9, Wis.

Constitution and By-Laws Committee—C. R. Visger, 7715 Brooklyn, Kansas City 5, Mo.

★ ★ ★

PLANS FOR SECOND REMA-RSES JOINT SHOW PROGRESSING

PLANS for the second REMA-RSES joint Educational Conference and Exhibit which is to be held at Hotel Bradford, Boston, Mass., October 8, 9, and 10, are well under way.

A joint meeting of international RSES representatives, the local host club committee and REMA's Educational Committee was held at Swampscott, Mass., June 3. At this time promotional plans were formulated and worked out to make it the finest educational meeting possible.

Many exhibitors, highly pleased by the results of the recent San Francisco Educational Conference, have returned to their plants with the intention of really going all out with special exhibits for future Refrigeration and Air Conditioning Educational Conferences.

Heading the group who are doing the

INTERNATIONAL COMMITTEES

INTERNATIONAL President Wm. J. Marshall, Toronto, has recently announced several additional committee appointments. With recent additions, the committees and their chairmen include:

International Educational Committee

—Paul B. Reed, Chairman, 3432 Downer Ave., Milwaukee 11, Wis.; Dr. W. O. Walker, Marinette, Wis.; Harry Busby, 433 N. Waller Ave., Chicago 44, Ill.; A. M. Schmitz, 11 So. Lake Ave., Albany 3, N. Y.; Al Sawyer, 5920 N. Pulaski, Chicago, Ill.; John Spence, 5055 Fairview, St. Louis 9, Mo.; Harold Halls, 3109 Beverly Blvd., Los Angeles 4, Calif.; A. E. Doan, R. R. 2, Weston, Ontario, Canada; and E. F. Asproth, 3306 Columbus Ave., S., Minneapolis 7, Minn.

TESTED...



End flange check. Inspector is measuring depth of lubricating pump plunger slot.

TESTED...



3000 kilogram pressure tests hardness of crankshaft. Impression's diameter is then measured microscopically.

TESTED...

to back your recommendation of GENERAL ELECTRIC CONDENSING UNITS

Why does General Electric submit its equipment to such expensive, thoroughgoing tests?

Because G. E. wants the double-backed prestige of having not only the best line of products, but the knowledge that each product has received the best attention G. E. knows how to give.

Thus do we back up our own selling features: the new CW line includes units from $\frac{1}{8}$ hp to $\frac{1}{4}$ hp . . . 8 air cooled and 4 water cooled models . . .

integrated in 3 basic compressor sizes, many parts of which are themselves interchangeable. Even the advantages to you of easier selection, wide capacity range, and lower parts stock have paved the way for newer, stricter tests . . . giving you greater dependability than ever before. The pride G. E. takes in its quality control is your assurance of equipment whose quality is truly beyond the ordinary . . . and whose quality is consistent! General Electric Company, Air Conditioning Dept., Section R-8126, Bloomfield, N. J.

GENERAL  ELECTRIC
Refrigeration Equipment

planning, are: John J. Madden, General Chairman; Lee Wallace, Asst. Chairman; Chas. E. Harris, Coordinator and Publicity; Arthur W. Andreen, Arrangements; James A. McCue, Chairman of the Housing Committee; Hermann F. Spoehrer, Chairman of REMA's Educational Committee and K. B. Thorn-dike, Vice President of REMA.

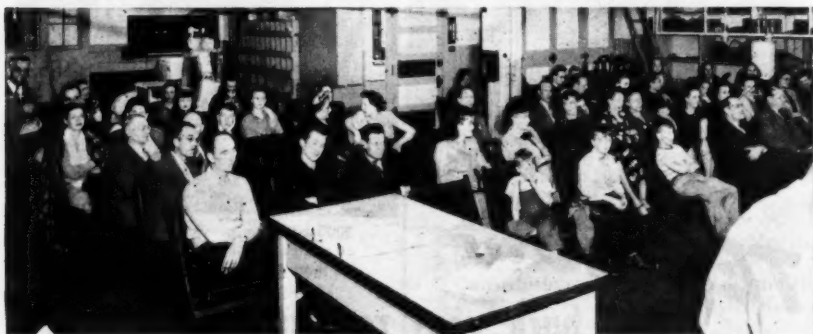
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MILE HIGH ANNUAL TUBE BENDING CONTEST

THE Mile High Chapter held its annual tube bending contest on May 11th at the Public Service Shops in

ing in pairs, for prizes totaling \$70.00. The problems were judged by three impartial judges and timed by two timers with stop watches. The judges were John Berger, National Director for the district; Ernest Martin, Past President of Mile High Chapter, and Willis Stafford, National Publicity Chairman. The timers were Ernest Schroeder and John Kirk. The first prize winners were Lloyd Reed and Chester Teel; second prize, Robert Wize and Mario Syracuse; third prize, Charles Connell and Ervin Larson.

Harold McCombs, McCombs Refrigeration Supply Co., Denver, Colo., donated the tubing for the contest and



Part of the crowd that watched the tube bending contest (See Front Cover) held by Mile High Chapter in Denver, Colorado, recently, is pictured above. To the left, top, are the winners of the contest who are, left to right: Mario Syracuse and Robert Wize, second prize winners; Lloyd Reed and Chester Teel, first prize; Ervin Larson and Charles Connell, third prize.

Judges and timers in the contest, shown in the bottom picture, are left to right: Ernest Schroeder, John Kirk, John Berger, Ernest Martin, and Willis Stafford.

compiled the drawings for the problem.

Willis Stafford, Chicago, Chairman of the International Publicity Committee, was present at the meeting on his return from the California Regional Conference and reported on the results of the convention, as well as extending an invitation for a good attendance from Mile High Chapter at the 11th Annual Convention of the Society in Chicago, November 19th.

Denver, Col. The attendance was 76. The contest this year was a problem which combined soft and hard soldering and tube bending and flaring.

There were twelve contestants work-

WATSCO REPLACEMENT TERMINALS

STOPS LEAKS WITHOUT OPENING UNIT



\$5⁵⁰ per set (3 terminals)

Thousands of WATSCO REPLACEMENT TERMINALS have been sold and accepted. Repair terminal leaks on sealed units easily, quickly and profitably . . . in 5 minutes. Work right on the job with only a ratchet wrench or pliers.

These wonderful WATSCO REPLACEMENT TERMINALS screw right over the original terminal post—seals the leak instantly and permanently!

Order
by
These
Part
Numbers

SEALED UNIT	T100	T300	T300	T400	T500	T600
ADMIRAL			*			
GOLDSBOT			*			
CHIEFTAIN			*			
COPELAMETIC			*			
CROSLLEY F12	*					
FRIGIDAIRE—to & incl. 1937		*				
FRIGIDAIRE—1938				*		
FRIGIDAIRE—1939 & later					*	
GIBSON			*			
KELVINATOR			*			
NORGE			*			
PHILCO			*			
STEWART-WARNER						*
TECUMSEH			*			
WESTINGHOUSE			*			

WATSCO carries the most complete line of outside REPLACEMENT TERMINALS and FLAPPERS for sealed units.

If your jobber cannot supply you, order direct from us, mentioning your jobbers name and address.

WRITE FOR FREE DESCRIPTIVE FOLDER AND PRICE LIST OF TERMINALS—CHECK VALVES—VANES—FLAPPERS, etc.

Wagner

TOOL and SUPPLY CORP.

1300 — 43rd Ave., Dept. RC, Long Island City 1, N. Y.

After the contest, members were entertained by 'Bob Harris and his Rocky Mountain Dudes' with some cowboy songs and old-time music. The drawing for door prize was held during the entertainment and Francis Hicks won the Philco radio. Sandwiches and coffee were served by the chapter.

★ ★ ★

INTERNATIONAL SOCIETY OFFERS "PACKAGED" PROGRAMS

RECOGNIZING the problem of providing local chapters with educational programs that will bring the type of information the chapter member

can their traveling expense be justified in visiting a single distant chapter.

"The Educational and Examining Board has been working out a method for bringing these men to you by means of sound-recordings, accompanied by illustrative slides. A number of these recordings are now available, several others are being prepared and will be ready shortly, and others have been selected but only partially prepared. The recordings now ready, and those being prepared, are on ten inch double-side disc records that can be played on an ordinary phonograph. The slides are standard 2x2 inches, 35 millimeter. A projector with a 150 watt bulb is suggested."

Recordings Now Available

Subject	Speaker	Number of 10" Discs	Number of Slides
Hermetic Refrigerating Machines.....	Carl L. Olin.....	4	0
Oil and Refrigerant Mixtures.....	Paul B. Reed.....	6	9
Reverse Cycle Refrigeration.....	Paul B. Reed.....	5	16
The Road Ahead.....	H. F. Hildreth.....	4	0
Safety.....	George Schuld.....	5	0
Solids in Refrigerating Systems.....	Dr. W. O. Walker.....	5	15

Lectures Now Being Prepared

Subject	Speaker
Compressor Shaft Seals.....	Paul B. Reed
Heating Effect in Driers.....	Dr. W. O. Walker
Refrigeration of Fresh Meats.....	John H. Spence
Simplifying your Air-Conditioning Problems.....	Dan D. Wile
Truck Refrigeration.....	Albert Sawyer

needs, the International Educational and Examining Board under the chairmanship of Paul B. Reed, is actively engaged in a project which in their opinion is a step forward in assisting the chapter's educational chairman in his work.

In a bulletin issued to the chapters it was pointed out that "one of the biggest problems of the chapter is to get speakers who know their subject, who are able to tell their story in an understandable manner, and who can and will give an educational presentation instead of a purely selling talk. Factory engineers, service supervisors and some sales people, who could give instructive and entertaining talks, have their jobs to do. They cannot spare the time, nor

ALTOONA RECEIVES CHARTER

IN A WELL attended meeting May 5, the Altoona Chapter in Altoona, Pa., received its charter from a representative of the National Society. Before the meeting was formally called to order, the Sergeant-at-Arms presided and a group photograph of all members present was taken as well as a "preview" shot of the presentation of the charter to President Herman Bender and the other officers, by Walter Booth. A brief recess followed after which the meeting was officially called to order by President Bender.

Mr. Bender introduced Walter Booth of Richmond, Va., Director and Ser-

INSTALLING THE DRIER IN THE COOL SUCTION LINE....

eliminates 90% of our service costs



... so says Mr. Bill Fletcher, chief engineer of Kansas City's Milgram Food Stores as he installs a "Cross-Flo" Drier-Filter (purchased from his wholesaler, Refrigeration Equipment Co.) in one of his installations employing Husman Refrigerators and Universal Condensing Units.

Solve your moisture problems too-

In the exclusive new Cross-Flo design, clogging and pressure drop are entirely eliminated; therefore, Cross-Flo Drier-Filters may be permanently installed in the cool suction line or cold lowside (at evaporator inlet or outlet). In these lower temperature locations, the drying efficiency of silica gel is so greatly increased that service costs due to moisture problems are almost entirely done away with.

Diagram below shows Cross-Flo's principle of flowing the refrigerant uniformly through the outside coarse-filter then slowly across the large cylindrical bed of drying agent, finally flowing slowly through the extra-large highly-efficient filter.



Carried in stock by leading wholesalers everywhere

Send for Circular 711-A for all the facts about temperature effect on drier performance.

REMCO HEAVY-DUTY
"Cross-Flo" DRIER-FILTERS
—CAPACITIES—

LIQUID LINE: $\frac{1}{4}$ to $7\frac{1}{2}$ HP
LOWSIDE: $\frac{1}{4}$ to 15 tons Freon-12
SUCTION LINE: $\frac{3}{8}$ " to $\frac{7}{8}$ " O. D.

REMCO
INCORPORATED
ZELIENOPLE, PENNSYLVANIA



geant-at-Arms of the International Society and guest speaker of the evening, who read the obligation of membership to all present and heard them repeat these obligations in unison. Mr. Booth then welcomed the Altoona Chapter and members to membership in the International Society and presented the charter. President Bender accepted on behalf of the chapter. Mr. Booth and Mr. Bender distributed membership certificates and cards to those present. Mr. Booth then

Altoona Chapter, Altoona, Pa., received its charter May 5, with Walter Booth, International Sergeant-at-Arms, doing the presenting. Pictured above are the members in attendance at the meeting, and at the left the officers of the chapter. They are, left to right: Sam Brandt, Sr., 2nd Vice-President; Maurice Bender, 1st Vice-President; Hassel Stere, Treasurer; Herman Bender, President; Manny Stein, Sergeant-at-Arms; Walter Booth, International Sergeant-at-Arms; and Charles C. Allen, Secretary.

briefly described the aims, objectives and some of the current educational activities of the Society, including joint REMA-RSES regional meetings.

A regular business meeting followed during which the minutes of the previous meeting were read and approved, and the Treasurer's report was submitted. President Bender appointed the following committees: Membership—John Chamberlain, A. Glenn Neville, Cecil Colyer. Entertainment—Tom Kibler, Pat Cummings, Manny Stein, Norman Maurer. Methods of raising funds for entertainment purposes were discussed and it was suggested and affirmatively voted that each month a tool worth \$5.00 be raffled, the balance of the proceeds to go into the chapter

Superior

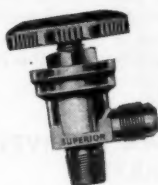
Life-Time DIAPHRAGM PACKLESS VALVES

OUTSTANDING FEATURES

1. Husky one-piece lower stem.
2. Controlled stem travel assures "Life-Time" diaphragm performance.
3. Scientific lubrication, large bearing surfaces and polished stem heads eliminate wear and assure smooth, easy operation.
4. Large drillings give full flow.
5. Operates under normal pressure with flow in opposite direction.

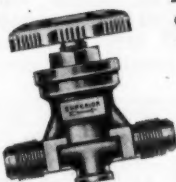


6. Smooth pleasing appearance — symmetrical design.
7. Individual wrench pads for tightening flare connections.
8. Unique sweat connections permit soft or silver soldering without removing internal assembly.
9. High quality, long wearing, seating insert.
10. No special tools required for servicing.



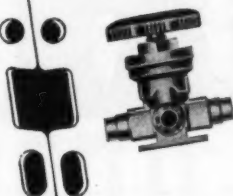
Superior ANGLE VALVES

CATALOG NUMBER	CONNECTIONS SIDE	CONNECTIONS BOTTOM	LIST PRICE EACH	NET WT. EACH LBS.	CODE WORD
104-4B	SAE Flare	Male Pipe	\$5.00	.75	Ledom
104-4C	"	"	5.00	.75	Ledro
104-4B	"	"	5.00	.75	Lelus
104-4C	"	"	5.00	.75	Leset
105-8B	"	"	5.00	1.00	Lezon
105-8C	"	"	5.00	1.00	Lejac
106-10B	"	"	6.00	1.25	Letad



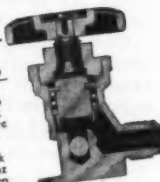
Superior LINE SHUT-OFF VALVES*

CATALOG NUMBER	CONNECTIONS	LIST PRICE EACH	NET WT. EACH LBS.	CODE WORD
304-4	SAE Flare	\$5.30	.9	Lelim
304-6	"	5.30	.9	Letot
305-8	"	5.30	1.25	Lemot
306-10	"	6.00	1.5	Lemjo
304-4S	O.D. Sweat	5.30	.9	Lemuz
304-6S	"	5.30	.9	Lenep
305-8S	"	5.30	1.25	Lenet
306-10S	"	6.00	1.5	Lenov



Superior BRANCH SHUT-OFF VALVES*

CATALOG NUMBER	CONNECTIONS	LIST PRICE EACH	NET WT. EACH LBS.	CODE WORD
304-4	SAE Flare	\$6.95	1.00	Lepen
304-6	"	6.95	1.00	Lepuc
305-8	"	6.95	1.50	Lepove
306-10	"	7.50	1.75	Leraj
304-4S	O.D. Sweat	6.95	1.00	Lesak
304-6S	"	6.95	1.00	Lesoz
305-8S	"	6.95	1.50	Letro
306-10S	"	7.50	1.75	Letul



Stocked By All Leading Wholesalers

Superior Valve and Fittings Co.



treasury, \$1.00 being the per capita donation.

Whether meetings should be held during July and August was discussed and it was decided by standing vote to discontinue regular meetings from June until September, June 2nd being the date of the last seasonal meeting.

★ ★ ★

IT'S AN IDEA

AT THE May meeting of the Granite State Chapter, J. Lawrence Hall, Educational Committee Chairman, presented the chapter with a gavel.



This gavel is not only handsome but it shows a unique originality that is worth passing on. The main body is made of a sweat tee with a $\frac{1}{2}$ " outlet into which a piece of $\frac{1}{2}$ " copper tubing is installed. This tubing is knurled for a hand grip, and a brass cap seals the end. There are two bakelite discs inserted in the large ends of the tee to make a strike and give a handsome appearance.

The chapter is proud of Mr. Hall's work, not only for the gavel, but because of his devotion to the educational work of the chapter.

SAN GABRIEL SPONSORS SCHOOL OF INSTRUCTION

SAN GABRIEL Valley Chapter reports that their Educational Chairman, Vernon Denny, and his committee are sponsoring an electrical course held every Monday evening at the Pasadena Junior College under the instruction of L. J. Kinnard. It is divided into eight sessions as follows:

1—Laws and applications of direct current. Ohm's law, wattage law, resistance laws.

2—Wiring diagrams, symbols, and circuits. General diagrams, cross-line diagrams.

3—Meters and their applications. Voltmeters, ammeters, Ohmmeters, wattmeters.

4—Alternating theory. Effective voltage and current. Inductance, capacitance, power factor.

5—A.C. motors, design. Types of single-phase motors. Three phase motors.

6—A.C. motors, applications. Horsepower, starting torque, power consumption.

7—Electrical systems in refrigeration. Motor starters and controllers. Applications to pumps.

8—Electrical trouble-shooting in refrigerators. Diagnosis of troubles. Circuit and motor testing.

Chapter President Clarence Stumpf, at a recent chapter meeting, pointed out the advantages of this course and expressed the opinion that no member of the chapter should miss out on it no matter how long he had been in the refrigeration business.

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BLACKHAWK RECEIVES CHARTER

THE Blackhawk Chapter, Burlington, Iowa, held its charter presentation dinner meeting May 3, at the Arion Club, with 32 members and guests pres-



Taken during the charter presentation dinner of the Blackhawk Chapter, the above photo shows, seated, left to right: E. R. Anderson, Board Chairman; Floyd Lilley, International Board of Directors; Ray Jones, President of the Iowa State Association; and Ervin Meyer, Past President of the Iowa group. Standing, left to right: Lawrence Oetken, Secretary-Treasurer; William Hogan, President; and Max Marsden, Sergeant-at-Arms, all of Blackhawk Chapter.



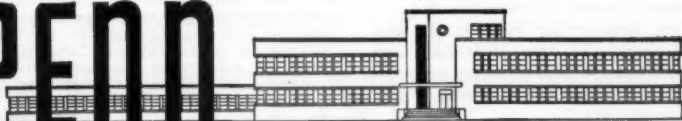
new!

Get the facts now, about this entirely new line of motor starters. Compact, easy-to-install, sturdily constructed for long life and dependability.

Built in sizes 0, 1 and 1½. Available with Type 1 enclosures or as open-type models for control panels. Overload relays easily adjustable for automatic or manual reset. Write now for Bulletin 2705 to Penn Electric Switch Co., Goshen, Indiana. Export Division: 13 East 40th Street, New York 16. In Canada: Penn Controls Ltd., Toronto, Ontario.

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AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, ENGINES, PUMPS AND AIR COMPRESSORS

ent. After dinner, Floyd Lilley, member of International Board of Directors, presented the charter to the Blackhawk chapter. Mr. Waterhouse of Owens-Corning Fibreglas Corp., gave a talk on insulation. A. L. Goley of Kold-Hold Mfg. Co., showed slides on various Kold-Hold plate installations. There were short talks by Ray Jones, Iowa State President, and Erv. Meyer, Ex-State President, who helped organize the Blackhawk Chapter in January.

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BUCKEYE STATE ASSOCIATION ANNUAL PICNIC

THE Buckeye State Association annual picnic will be held Sunday, July 11, at Recreation Park, Dayton, Ohio.

It will be an all day outing with everything furnished at a registration fee of \$5.00 per couple. Children are free. Registration should be made with D. R. Goll, 220 Fernwood Ave., Dayton, as early as possible. For those who plan on making the trip on Saturday and staying overnight, accommodations can be secured in the Hotel Miami. Follow the signs on Route 202 to Powell Road. Take the family and plan for a day of fun for everyone.

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CLEVELAND INCORPORATES

THE June meeting held in the Sterling Hotel, was an important event in the history of the Cleveland Chapter. It was the first meeting of the chapter as an incorporated organization, and climaxed a year of hard work by the local officers and their committees. Wallace Heiser, Cleveland lawyer acting as a legal adviser, was present to receive the minutes of the first meeting and to deliver to the chapter the articles of incorporation.

The guest speaker for the evening was Byron Halstead of the Halstead and Mitchell Company, who gave an informative talk on "Water Coolers and Water Cooled Condensers."

It was announced that Frank Kurnik had successfully passed the qualifying test and has been raised from a Junior to an Active member. Frank is especially to be congratulated because he answered correctly 48 of the 50 questions

although only 25 answers are required.

Tentative plans have been set up for the chapter to attend a baseball game between the Cleveland Indians and the New York Yankees during the next month.

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Chapter Notes

● **ALLEGANY VALLEY CHAPTER, Olean, N. Y., May 11**—During the business meeting, the Wage and Hour Committee reported on prevailing rates in surrounding territory, and a discussion was held concerning manufacturers' policy in selling direct to the user. Chapter officers to serve until the end of 1948 are as follows: Leslie E. Wanamaker, President; Loren V. Goodrich, 1st Vice-President; Robert A. Lewis, 2nd Vice-President; Donald Wilson, Treasurer; Kenneth P. Kester, Secretary; and J. Paul Boedecker, Educational Committee Chairman. Board of Directors—Ralph R. Wanamaker, James H. Palmer and W. W. Wilson.

● **ARROWHEAD CHAPTER, Riverside, Calif., Apr. 12**—Educational Director Carlton Ricker introduced Tom Renzl of Van's Supply, Long Beach, who in turn presented the speaker of the evening, Bob Smith of Eutetic Welding. Mr. Smith gave a demonstration of low-temperature welding, using special alloys and fluxes. This included the repairing of aluminum and the welding of a piece of copper tubing to a sheet of stainless steel. Prizes for the evening included a Hallowell Auto-Kit and two pocket thermometers donated by Refrigeration Sales & Maintenance Co., a \$2.00 merchandise order donated by Valley Refrigeration Supply, and a \$2.50 money order donated by Van's Supply. First prize—the Auto-Kit—was won by Max Lane.

The May 10th meeting was attended by 28 members and 10 visitors. The educational program consisted of scientific films presented by Carlton Ricker. Prizes for the evening were an oil can and a \$3.00 merchandise order.

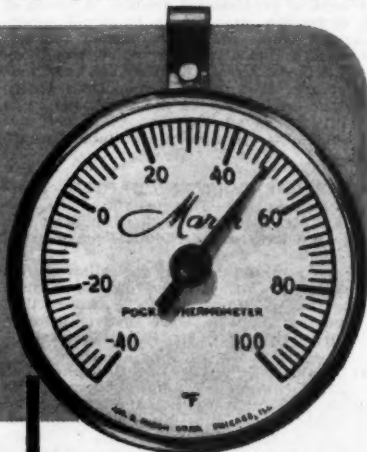
● **AZALEA CITY CHAPTER, Mobile, Ala., Apr. 21**—It was unanimously voted to accept K. J. Dixon into the chapter as an active member, and Willene Smith as a junior member, after their respective applications had been read and approved. After chapter business had been completed, D. P. Breland, Chairman of the Educational Committee, conducted an interesting discussion from two prepared papers, namely: "Theory and Use of Capillary Tube" and "Freon-22."

The educational program on May 19th was a moving picture entitled "It All Adds Up" secured through the courtesy of the Alabama Power Co. and Westinghouse Corp.

● **BEEHIVE CHAPTER, Salt Lake City, Utah, Apr. 23**—This was the date of the chapter's annual party which was attended by approxi-

Handiest and best Pocket Thermometer ever!

THE New MARSH POCKET THERMOMETER



It's watch-like in size and style. Easy to read in poorest light. Highly accurate. Has "Recalibrator slide" to keep it accurate. Rugged—in handsome, polished case of durable, heavy-gauge stainless steel. Unbreakable crystal. Sold at an unbelievably low price.

No guessing at error caused by handling or room temperature as with hard-to-read glass tube thermometers. Just place this instrument in freezing compartment, close refrigerator until temperature registers, open refrigerator and instantly read temperature on clear, legible dial.

This is a handy addition to every refrigerator serviceman's kit, developed by Marsh out of 80 years' experience in precision-instrument making.

JAS. P. MARSH CORPORATION
DEPT. Q, SKOKIE, ILLINOIS

Actual size
above
(2-3/16"
diam.)

Typical Marsh
value. \$2.00



Clip holds Thermometer in pocket; also serves as hanger when used in refrigerator. Clip swivels to fit any position.

If ever knocked out of adjustment Thermometer has this "Recalibrator slide" for quickly correcting it to a thermometer of known accuracy.



Your Jobber has it in stock

MARSH

BUY FROM YOUR WHOLESALE

Refrigeration Instruments

mately 75 persons. Although the acts which followed dinner were put on by local talent, they were of professional quality. A group of girls under the tutorage of Johnny Patchen, theatrical agent and dance school teacher, performed a dance number which was thoroughly enjoyed by all. Another act was "Madame Marie Pedrovski—Metropolitan Opera Star" put on by one of the local men who not only portrayed the part very well but sang some arias in a very creditable falsetto voice.

● **BERKSHIRE COUNTY CHAPTER, Pittsfield, Mass., Apr. 28**—The speaker of the evening was Mr. Binns of Virginia Smelting Co., who gave a talk on the chemical make-up of refrigerants.

On May 12th, the meeting was followed by a talk given by Mr. Krueger on the subject "Refrigeration Fundamentals." After this, two moving pictures were shown through the courtesy of the Curtis Photo Service.

● **BLUE RIDGE CHAPTER, Roanoke, Va., May 20**—The chapter's annual banquet was held on this night, with an attendance of about 150. A delicious dinner was served, after which dancing was enjoyed by members and their guests. Officers elected to serve for the year 1948-49 are: H. S. Beumer, President; W. M. Bryant, 1st Vice-President; G. S. Brice, 2nd Vice-President; I. Jones Keller, Secretary-Treasurer; and M. O. Airheart, Educational Committee Chairman. Board of Directors—W. G. Andrews, J. M. Stull, C. E. Etheridge, C. H. Kessler, R. T. Nolen.

● **CANTON REGIONAL CHAPTER, Canton, Ohio, Apr. 20**—This was a combination dinner and business meeting during which the following men were accepted into the chapter. Jack Scott, George Maxin, Lloyd Yoho and Herbert Werstler as junior members; A. J. Tipton as active member; and Matthew Salapack as associate member. Leonard Petry was elected chapter President to take the place of Carl Hovenstine who requested the chapter to accept his resignation due to his election as President of the Buckeye State Association. W. K. Allardice and W. B. Hickman were appointed chairmen of the Entertainment Committee, to replace Wm. Hintz who resigned. Dick Hollingsworth then gave a talk on the advantages of being affiliated with the State Association.

● **CENTRAL NEW YORK CHAPTER, Syracuse, N. Y., May 13**—The annual spring banquet and dance was held at Fayetteville-Manlius Rod and Gun Club. After a delicious turkey dinner, the raffle was held—with Paul Cross acting as master of ceremonies, and ably assisted by Hollis Todd. The items awarded were refrigeration tools and small appliances. Dancing was enjoyed the balance of the evening.

● **CENTRAL PENNSYLVANIA CHAPTER, Harrisburg, Pa., May 20**—After completion of the business meeting, President LeFevre presented A. D. Sullivan and Frank Wilson of Brunner Manufacturing Co. Mr. Sullivan then explained the company's method of capacity control on refrigeration systems.

● **CLEVELAND CHAPTER, Cleveland, Ohio, May 11**—Just to prove that it has come up in the world, the Cleveland Chapter held this meeting in the Penthouse of the Allerton Hotel. The educational portion of the program featured Lynn (Rusty) Wetzel, field engineer of the General Controls Co., who gave an interesting talk on expansion valves and solenoid valves. The chapter members used the question and answer period following the talk to bring out several valuable points on superheat settings and placement of external equalizer tubes. The members gave Mr. Wetzel and his associates, Ed Malarkey and Mel Lewis, a rising vote of thanks for the fine educational program presented and the refreshments which followed. New members who took the oath of obligation include Patrick Fenick, Fred Powell, Jim Daley and Joe DeAngelo. George Schuld, Sr. was elected to the Board of Directors to fill the position left vacant by the recent death of Walter Wright.

● **COLUMBUS CHAPTER, Columbus, Ohio, May 12**—After business was completed, the meeting was turned over to Earl Yockey who introduced Douglas Salisbury of Nash Kelvinator. Mr. Salisbury provided the educational program for the evening.

● **CORPUS CHRISTI CHAPTER, Corpus Christi, Tex., May 11**—P. E. Tatum attended a meeting of the San Antonio Chapter and Wallace Lindeman was present at the May meeting of the Houston Chapter. Both these men gave a report of their trip. During the business session, R. O. Johnson and James R. Renfro were elected to membership. On the educational program, Mr. McCarthy of the Sporlan Valve Co. gave a slide lecture on expansion valves which was very educational and enjoyed by all.

● **CUMBERLAND TRI-STATE CHAPTER, Cumberland, Md., Apr. 6**—Officers elected for the coming year are: D. L. Tichnell, President; Harry Schurg, Vice-President; Ralph Harmon, Secretary-Treasurer; J. V. Grabenstein, Sergeant-at-Arms; and Joe Sirna, Educational Chairman. Board of Directors—D. L. Tichnell, Harry Schurg, Ralph Harmon, Joe Sirna, J. V. Grabenstein, Vince Grabenstein, L. Tyree, H. S. Hughes, D. Wagoner, and C. Flanagan.

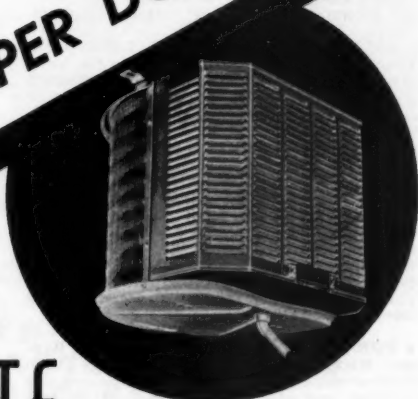
● **DAYTON CHAPTER, Dayton, Ohio, May 13**—The guest speaker of the evening was T. G. Crider of the Crider Corporation, Lima, Ohio. Mr. Crider gave a comprehensive talk on Multi-stage compression.

Those who attended the May 27th meeting saw an interesting picture presented by Messrs. Walker and Michel of the Dayton Rubber Mfg. Co. These men had hoped to arrange a tour through their factory but it was impossible to do so because of the remodeling being done. However, they assured the members that this tour would take place at a later date.

● **DISTRICT OF COLUMBIA CHAPTER, Washington, D. C., May 13**—A total of 85 members and guests attended this meeting, during which ten new members were accepted.



MORE BTU's
PER DOLLAR



KRAMER
CURVETTE *Unit Cooler*

- LOW COST** Extreme low price is the result of mass production. The unique design gives maximum capacity per unit of space.
- WELL MADE** Complete unit constructed of aluminum and copper. No rusting. The motor is totally enclosed, permanently lubricated, requiring no oiling.
- EFFICIENT** The radial airflow assures uniform, refrigerator temperature.

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KRAMER TRENTON CO. Trenton 5, N. J.

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CONDENSERS Air Cooled Water Cooled Evaporators WATER COOLING EVAPORATORS · BLAST COOLING COILS · BLAST HEATING COILS

They are Messrs. D. Zentz, V. Zentz, Schenkel, Warren, Dillard, Borgman, White, Pollock, Miller and Beeker. The speaker on the educational program was Charles Segal, Chief Engineer, Kramer Trenton Co. He gave an excellent talk and demonstration of Kramer's Thermobank automatic defrost system. Mr. Segal's discussion was well received and many questions were answered regarding the ever-present defrost problem. Harry Klingler, Sales Manager of Kamer Trenton was also a guest. The door prize—a gauge manifold complete with gauges, donated by Milton Rosenfield of Refrigeration Supply Co.—was won by a guest, Mr. Mathieson. Refreshments completed the evening.

● **EVANSVILLE CHAPTER, Evansville, Ind., Apr. 29**—The Hoosier State Association was discussed at length, and a report on its progress given by delegate Chas. D. Powell. The educational program consisted of a question and answer period, with all present joining in.

● **FLORIDA WEST COAST CHAPTER, Tampa, Fla., Apr. 8**—A good part of the business meeting was devoted to a discussion on ways and means to increase attendance at the meetings. A round table talk between those present on the subject of new products, reconditioning and renewal of parts and units, wound up the evening.

● **FORT WAYNE CHAPTER, Fort Wayne, Ind., May 6**—Educational Director Gildea secured Mr. Newcum of the Remco Mfg. Co., for the guest speaker of the evening. Mr. Newcum gave a splendid talk on the application of driers in refrigeration systems. The signed register showed 39 present at the meeting.

● **FURNITURE CITY CHAPTER, Grand Rapids, Mich., May 3**—Twelve members from Southwestern Michigan Chapter attended this meeting, and after the business portion was over, Ken Newcum of Remco, Inc. gave an educational talk on Cross-Flo driers. A lively question and answer period followed.

● **GREENVILLE CHAPTER, Greenville, S. C., May 12**—No business meeting was held on this date because of the small attendance. The educational program consisted of a slide film called "Comfort with Automatic Heating" presented by Mr. Peterson of Automatic Products Co.

● **HEAD OF THE LAKES CHAPTER, Duluth, Minn., May 11**—The meeting was held in the Rathskeller Room of the Duluth Brewing and Malting Co. Guest speaker was John Wickstrom of Imperial Brass Company, who displayed many of his company's products. The item that drew most attention was Imperial's No. 300F flaring tool. Refreshments were served at the end of the evening.

● **HOUSTON CHAPTER, Houston, Texas, Apr. 13**—International Director C. W. Neisel was present and gave a short talk about membership in the Society. Educational Chairman A. A. Haney then introduced Mr. Chat-teneuff of the Bridgeport Brass & Copper Co., who gave a narration and showed a film called "Metal of the Ages" which was both

educational and entertaining. Other special guests at the meeting included Wallace Lenderman, P. E. Tatum, Robert Mills and Phil Israel.

At the May 11th meeting, two films were shown on the educational program. One was on the chemical stability of refrigerants, given by V. G. Burkhard of Cox and Blackburn; and the other was entitled "Typhoon" and was shown by Dick Gallagher of Typhoon Company.

● **HUDSON MOHAWK CHAPTER, Schenectady, N. Y., Apr. 6**—Educational Chairman Douglas Marshall introduced T. W. McQuinn who gave a talk on bookkeeping, corporation taxes, forming a corporation, federal taxes, and other related subjects. Motion pictures showing the servicing of household refrigerators were also part of the educational program.

Those in attendance at the May 4th meeting saw a demonstration given by L. S. Dunn, president of the McIntire Connector Co. in Newark. After giving a talk about the troubles that can come from moisture in a refrigerator system and pointing out the merits of his company's dehydrator, Mr. Dunn poured two ounces of water into the liquid line of a portable machine, trapping all of it in the dehydrator so that none of it reached the expansion valve to freeze it. Mr. Dunn then answered all questions put to him by the group.

● **INDIANAPOLIS CHAPTER, Indianapolis, Ind., Mar. 23**—A rather unusual educational program was planned for this meeting. After introducing Mr. Weichers of Ansul Chemical Company, Fire Chief Murray, and a captain of the Indianapolis Fire Department, the meeting was adjourned to a Sears Roebuck parking lot where fires were started with gasoline and the members present used an Ansul extinguisher to put-out the flames. All present were impressed with the efficiency of this extinguisher.

On April 27th, Messrs. Huffman and Walters of the Acetylene Products Co., gave a demonstration and lecture on leak detecting, soldering and brazing with a Prest-O-Lite outfit. Mr. Wulf gave a demonstration of welding with Sil-Fos.

● **KERN COUNTY CHAPTER, Bakersfield, Calif., May 27**—Officers elected for the fiscal year are: Russell Chrestensen, President; Ralph Andrews, 1st Vice-President; John Wright, 2nd Vice-President; Chet Trone, Treasurer; Jim Tuttle, Sergeant-at-Arms; and Sam Grove, Educational Chairman. Board of Directors—Lee Holly, Joe Smith, Roy Shannon, Lee Davies and Dave Shannon.

● **LITTLE EGYPT CHAPTER, Benton, Ill., May 5**—There were 31 members and 11 guests present at this meeting to hear a talk on the subject of compressors, made by Mr. Menard of Brunner Mfg. Co. R. T. Moony, store manager of the Budlock Refrigeration Supply Co. in Evansville, Ind. was also introduced, and he in turn presented Ernie Tooke, parts manager, Herman Rempke, counterman, and S. Crawford, salesman. Refreshments were supplied by Budlock Refrigeration Supply Co.

Dehydrated COPPER TUBING!



PERFECTLY WRAPPED—SEALED—AND CARTONED—FOR PROTECTION AND CONVENIENCE IN STOCKING—

★ 1/8 THRU 1/4 .030 WALL ★ 5/16 THRU 1/2 .032 WALL ★ 5/8 THRU 3/4 .035 WALL
50 FT. LENGTHS

Mueller Brass Co. Dehydrated Copper Tube Coils are now being cartoned as an added precaution against damage and to facilitate greater ease in handling and stocking.

Within the carton, each coil is carefully wrapped and labeled for your convenience. Our Dehydrated Copper Tubing is consistently bright, clean and as dry as is humanly possible to make it. It is uniformly annealed dead soft so that it can be easily formed, bent or flared without danger of fracture.

ORDER FROM YOUR WHOLESALE

MUELLER BRASS CO.
PORT HURON, MICHIGAN

● **METROPOLITAN NEW YORK CHAPTER, New York, N. Y., Apr. 23**—The educational program for the evening was provided by Mr. Newton of Chrysler Airtemp, who with the use of slides gave a lecture on various types of air conditioning installations. Many interesting facts were brought out on the use of small package units instead of a central plant for air conditioning a large area. James White gave away samples of a new product called Dis-solve, a solvent for cleaning stuck-up pumps. There were 42 members and 21 guests present, and the dark horse prize was won by a guest—E. Dondaro.

● **MIAMI CHAPTER, Miami, Fla., Apr. 14**—It was reported that copies of the new city code have been printed and are to be presented to each City Commissioner and the City Manager. Johnny Dolard was elected 2nd Vice-President to take the place of Frank Leach, and John Refeen was elected to the Board of Directors to replace J. H. Colvin who no longer resides in the area. A discussion of current refrigeration and air conditioning problems was directed by Orville Brown.

● **NIAGARA FRONTIER CHAPTER, Buffalo, N. Y., May**—All officers and 35 members and guests were present at this meeting, during which Fred DeWolf was accepted to active membership. After chapter business was taken care of, C. Ray Lowe of Frigidaire discussed "Stability of the Refrigerative System." Then a sketch entitled "The Poor Parts Salesman" was put on by Jack O'Neil and Bob Fox. A door prize of a \$15.00 motor repair, donated by Henry Phole, was won by Earl Clark—and another prize of a set of Quicke Ice Cube Trays, donated by Frigidaire, was won by Paul Waldman. Refreshments were then served.

● **NOVA SCOTIA CHAPTER, Halifax, N. S., Apr. 17**—Four new members were sworn in and welcomed to the chapter during this meeting. Election of officers was also held with the following results: Fred Williams, President; L. Mullenger, 1st Vice-President; E. A. Fraser, 2nd Vice-President; C. J. Tredwell, Secretary-Treasurer; C. E. Church, Sergeant-at-Arms; and G. Wilson, Educational Chairman. After refreshments were served, some gathered around the piano while others just sat and talked.

● **ONTARIO MAPLE LEAF CHAPTER, Toronto, Ont., Apr. 16**—After the regular business meeting and the appointment of several committee chairmen, the meeting was turned over to A. E. Doan to introduce the educational program, "Excursions into Science," a film on scientific development. This film was presented through the cooperation of Jack Grant and Canadian General Electric.

● **QUINCY CHAPTER, Quincy, Ill., Apr. 19**—Ed. Riccio of Chicago, New Chapter Committee Chairman, was present to explain the purpose of the organization to the members. Officers elected to serve until next January are: Lawrence Zimmerman, President; Joseph Heeger, Vice-President; Richard McCollum, Secretary-Treasurer; Carl Lafferty, Sergeant-

at-Arms; and Ralph Zimmerman, Educational Director. Board of Directors—Roy Hyer, Bert Gentman and Henry Brueske. A membership, entertainment and publicity committee was appointed with its respective chairman, before adjournment.

● **ROCHESTER CHAPTER, Rochester, N. Y., Apr. 14**—The featured speaker of the evening was Bill Eves of Linde Air Products on the subject, "Manufacture and Handling of Gases." Following this, Bob Jackson and "Mac" MacKenzie of Jackson Welding Supply, demonstrated welding and silver soldering. A buffet lunch served by the Ladies Auxiliary topped off a full evening.

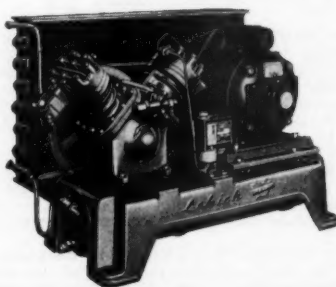


Clarence Stumpf, President of San Gabriel Chapter in California and former President of Illinois State Association, calls for order with his custom made gavel during a little horseplay at a recent meeting. Seated, left, is Emil Luckert and, right, Ray Waters, Secretary of the chapter.

● **SOUTHERN TIER CHAPTER, Elmira, N. Y., May 20**—The educational program for the evening was a talk and demonstration on the operation of thermostatic expansion valves, given by Mr. Richinbach of the Sporian Valve Co. Afterwards, it was decided to send a letter of thanks to Sporian for the excellent way this demonstration was put on.

● **TOLEDO CHAPTER, Toledo, Ohio, May 12**—Preceding the business meeting, All State Welding Co. of White Plains, N. Y., gave a welding demonstration using their various welding rods and fluxes. Doc Winton, Regional Manager, George Gambrell, distributor of Northern Ohio, M. B. Watson, H. P. Wood, and Paul Cadaret, all distributors from Detroit, put on the demonstration. This was followed by a lengthy discussion on welding problems. A total of 51 enjoyed the meeting.

● **TRENTON CHAPTER, Trenton, N. J., May 19**—E. Paul Secrest of the S & M Electric Motor Repairs, an associate member of the chapter, gave a very interesting talk on installation and protection of motors. Mr. Secrest put particular stress on several causes of motor failure such as overloaded lines, low voltage, improper fuse protection and poor connections such as are found in the re-



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Air & Water Cooled

For High, Medium or Low Temperature
Freon or Methyl Chloride

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★ STANDARD DUTY AIR COOLED

$\frac{1}{3}$ H.P. $\frac{1}{2}$ H.P. $\frac{3}{4}$ H.P.

★ HEAVY DUTY AIR COOLED

$\frac{1}{3}$ H.P. $\frac{1}{2}$ H.P. $\frac{3}{4}$ H.P.
1 H.P. $1\frac{1}{2}$ H.P. 2 H.P.

★ HEAVY DUTY WATER COOLED

$\frac{1}{2}$ H.P. $\frac{3}{4}$ H.P. 1 H.P. $1\frac{1}{2}$ H.P.
2 H.P. 3 H.P. 5 H.P.

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Ask about our COMBINATION
AIR-AND-WATER-COOLED UNITS
 $\frac{3}{4}$ H.P. through 2 H.P.
for special applications.

Lehigh BLU-COLD

HEAVY DUTY CONDENSING UNITS

Manufactured By

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Plant—LANCASTER, PENNA.

newable type fuse where several metals are used and fuses are not made tight. Schedules showing the proper fuse protection for various motors were passed out to all of the members. Several questions came from the floor and were satisfactorily answered by Mr. Secrest. First door prize, a Ranco control donated by George H. Wood, Jr. of the Princeton Municipal Improvement, Inc., went to Andrew Pagnotta. Second door prize, a tube cutter donated by Jaeger's Sales and Supplies, went to James E. Falcone. The 50-50 club drawing was won by Carl Kukla.

● **TRI-COUNTY CHAPTER, Joliet, Ill., Apr. 17**—During the business meeting, two new members, Ray Ryburn and Howard Lemke, were accepted by the chapter. Dick Marquis introduced the guest speaker, Russell Johnson, who gave a very interesting talk on the heat pump, and answered many questions afterward. Short talks on refrigeration problems were also given by Harold Ellis, Wm. McCarley, Harold Anderson and Dick Marquis. The attendance drawing was won by John Zella.

● **VIRGINIA CHAPTER, Richmond, Va., May 17th**—The highlight of this meeting was a talk and demonstration on the operation and servicing of Kramer Thermobank, given by Mr. Segal of Kramer-Trenton Co. Harry Kingler was also a guest at the meeting.

● **WESTERN MASSACHUSETTS CHAPTER, Springfield, Mass., Apr. 27**—Educational speaker at this meeting was James Carge who gave a talk on cleaning parts, using the buffing method, and making high speed motors of regular motors. Sandwiches and coffee were served at the close of the meeting.

On May 11th the chapter had as their guest, Jules Endweiss of the Henry Valve Co., who showed slides and explained the various products manufactured by his company. He also showed cut-away samples of some of the products. The 19 in attendance spent an interesting and instructive evening.

● **WOLVERINE CHAPTER, Lansing, Mich., May 10**—After a brief business meeting, Albert Gary introduced Joe Oberc of Detroit. In his talk, Mr. Oberc mentioned that some 14 years ago he helped organize a chapter in Detroit, and then he introduced Bert Smith, his Lansing branch manager, and Jack Briggs, his sales manager. Mr. Oberc then showed a movie on the Louis-Wolcott fight and another one on fishing and lumbering. Refreshments were served after the movies.

● **YOUNGSTOWN CHAPTER, Youngstown, Ohio, Apr. 23**—Election of officers was held with the following being chosen to serve for the coming year: Wesley Drake, President; Walter Hasse, Vice-President; Verne Dieter, Secretary-Treasurer; and Al Marconi, Sergeant-at-Arms.

Guests present at the May 18th meeting included George Schuld, National Safety Director; George Baumgartner; Carl Howenstein, President of Buckeye State Association; and Dick Hollingsworth, President of Cleveland Chapter. Mr. Howenstein suggested that chapters in the territory stagger their meeting dates so that it would be possible to get

more speakers to come into the territory and speak before as many chapters as they can. George Schuld gave an interesting talk on safety and many good service pointers. Refreshments were served by Dal Nutt of Refrigeration Supplies.

LADIES AUXILIARY

● **CANTON CARDINAL AUXILIARY, Canton, Ohio, Apr. 20**—Election of officers was held at this meeting and the following were elected to serve until January, 1949: Mrs. Othella Finney, President; Mrs. Margaret Frantz, Vice-President; Mrs. Ida Kuhns, Secretary-Treasurer; and Mrs. Irene Howenstine, Sergeant-at-Arms. Board of Directors—Mrs. Doris Petry, Chairman, Mrs. D. C. MacBeth and Mrs. Chrystal Snyder. Several committees were appointed by the President before the meeting closed. Attendance was 20.

● **DAYTON AUXILIARY, Dayton, Ohio, May 27**—During the business meeting, President Alice Yauch accepted the resignation of Virginia Sherwood, Secretary, and Alice Goll was appointed to replace her. The Ladies Auxiliary will help with arrangements for the state association picnic to be held July 10 and 11 in Dayton, Ohio.

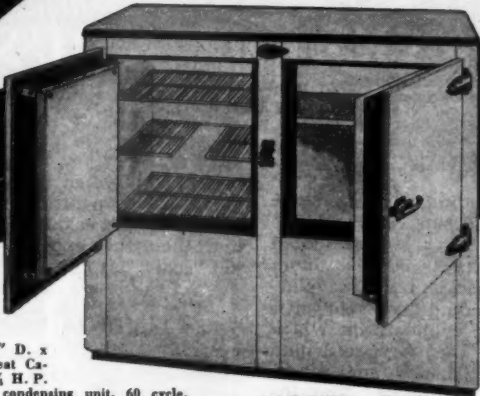
● **MOTOR CITY AUXILIARY, Flint, Mich., May 25**—The meeting was held at the home of Mrs. Austin Boyer. A letter was read from the Veterans Administration thanking the auxiliary for the scrap books sent to them. Plans for summer social meetings were discussed before adjournment.

● **NIAGARA FRONTIER AUXILIARY, Buffalo, N. Y., Apr. 9**—Guests at this meeting included Mrs. Van Derwalker, Mrs. Reed and Miss Vagg. After auxiliary business was completed, bingo was played and the Dark Horse prize drawn. It was won by Mrs. Reed.

● **OIL CAPITAL AUXILIARY, Tulsa, Okla., May 18**—This meeting, devoted mostly to business matters, had an attendance of 10 members and one guest. It was decided to postpone the auxiliary party until the fall.

● **ROCKFORD AUXILIARY, Rockford, Ill.**—The April meeting was held at the home of Mrs. Leslie Sturch. The following members were elected for the following year: Mrs. Robert Weygant, President; Mrs. Leslie Sturch, Vice-President; Mrs. R. C. McCarthy, Secretary; Mrs. Roy Shipman, Treasurer; and Mrs. Henry Genin, Sergeant-at-Arms. The new officers will be installed at the next meeting to be held at the home of Mrs. R. C. McCarthy. Refreshments were served by Mrs. Shipman and a wonderful time was had by all the ladies.

● **WICHITA AUXILIARY, Wichita, Kansas**—The auxiliary held an informal meeting May 21st to honor their National Secretary, Mrs. Edna Visger. The evening was spent with discussion of auxiliary problems and informal games. Katherine Knox was hostess and served refreshments of fruit punch and homemade cookies.



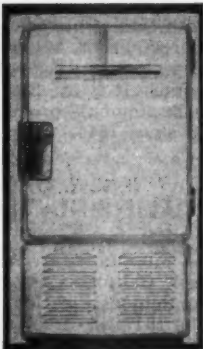
MODEL C-1148

4½ cu. ft. 35°-50° F. Refrigeration combined with 6¼ cu. ft. of zero frozen storage.
 Size: 48½" W. x 28" D. x 40¼" H. Frozen Meat Capacity—250-300 lbs. ¼ H. P. Hermetic, quiet-type condensing unit, 60 cycle, 115 volts A. C.

Quicfrez TRIZONE

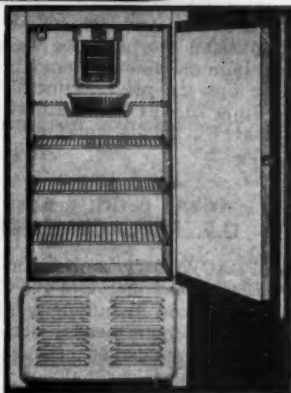
TE45

23¼" wide x 18" deep (on body)
 20½" deep (over hardware) x 41" high. 4 cu. ft. net food storage, and 7.2 sq. ft. shelf area including quart milk bottle space. Heavy overlapping doors with sturdy hardware. Large cooling unit capable of making 4 lbs. of ice per freezing.



TE60

23¼" wide x 18" deep (on body)
 20½" deep (over hardware) x 55" high. 6 cu. ft. net food storage and 9.6 sq. ft. shelf area including qt. milk bottle space. Large cooling unit capable of making 6 lbs. of ice per freezing.



ELECTRIC TRAILER REFRIGERATORS

SANITARY REFRIGERATOR CO. FOND DU LAC, WIS.

NEWS OF THE EQUIPMENT INDUSTRY



"F-12" PRICES INCREASE

ADVANCES in loading, handling, shipping and warehousing costs over the past thirty months have necessitated increases in prices of "Freon-12" fluorine refrigerant when shipped in cylinders up to and including 145 lb. capacity. These are the size cylinders on which Kinetic Chemicals, Inc., pays outbound freight on filled cylinders and return freight on empty cylinders. The increase in price amounts to approximately ten per cent. There is no change in price for "Freon-12" in one ton containers which are sold f.o.b. plants at Carney's Point, New Jersey, and East Chicago, Indiana.

This action was delayed as long as possible and the increases were held to the minimum practical amounts.

The upward price adjustment, effective June 26, 1948, is the first made by Kinetic Chemicals in the history of "Freon-12."

★ ★ ★

G.E. REPLACEMENTS

REPLACEMENT units for General Electric refrigerators are once again being produced in sufficient numbers to supply customer needs, according to W. C. Noll, manager of the technical and educational sections of the Company's product service division.

Since most refrigerator breakdowns occur during the hot summer months, Mr. Noll said, dealers should have replacement units on hand to maintain their reputation for dependable service. The highly seasonal nature of the refrigerator replacement unit business is indicated by the fact that 50% of the installations are made in the four summer months, while less than 20% are made from November through February.

With the peak being reached in summer, dealers have been advised by Mr. Noll to place their orders for replace-

ment units early so that their stocks will be adequate when the demand is at its greatest. He pointed out that when a refrigerator breaks down in the summer, the owner expects it to be serviced not "soon" but "at once."

★ ★ ★

AMMONIA PRICE IS UP

THE Du Pont Company announced recently an increase in the price of anhydrous ammonia.

The company said increases in the cost of raw materials, production and shipping have made it necessary to increase the price of anhydrous ammonia, in tank-car lots, to \$70 a ton for the commercial grade, and \$72.50 a ton for refrigeration grade. Ammoniacal liquor will be \$76 a ton. This compares with former prices of \$59 a ton for commercial grade, \$61.50 a ton for refrigeration grade and \$65 a ton for ammoniacal liquor. It is the first time that Du Pont bulk ammonia prices have been increased since 1944.

★ ★ ★

R.M.A. OF SOUTHERN CALIFORNIA ELECTS OFFICERS

THE members of the Refrigeration Manufacturers Association of Southern California at their last meeting unanimously reelected for another year the 1947-'48 directors of the Association.

The men who will serve during the 1948-'49 year as directors of this Association are:

B. R. Glazer, Super Cold Corporation, Los Angeles.

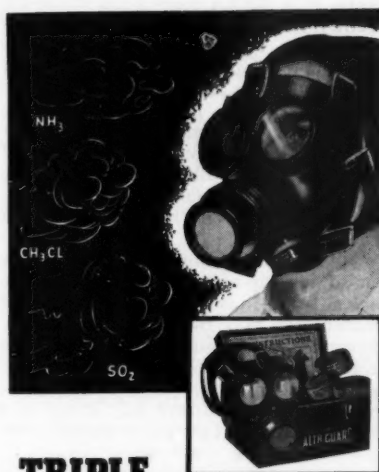
C. S. Meyers, Weber Showcase & Fixture Company, Los Angeles.

B. H. Bakke, Coldew Corporation, South Gate.

H. T. Jarvis, Refrigeration Engineering, Inc., Los Angeles.

Harry Ward, Ward Refrigerator & Mfg. Company, Los Angeles.

The directors at their first meeting in the new year reelected the previous



TRIPLE PROTECTION with CESCO's 605 Fume Kit

CESCO's Healthguard Fume Kit (No. 605) offers *triple protection* to refrigeration servicemen. Quick-change filter cartridges assure safety against ammonia, methyl-chloride and sulphur-dioxide fumes . . . *all in one convenient carrying case.*

The soft molded rubber face-piece of the fume mask, and the adjustable headgear assure a gastight, comfortable fit for every wearer. Large safety glass lenses give perfect visibility.

The CESCO Healthguard Kit provides *economical* protection because it is *moderately* priced.

Write for CESCO's No. 605 Safety Bulletin for complete information

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Chicago 12, Illinois



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FOR SAFETY

SERVICE ENGINEER



THE LIQUID EYE

A new type of
liquid indicator

- Eliminates Pressure Drop
- Light, sturdy construction
- Positive reaction of indicator
- Pyrex tubing insures safety
- Proven under field conditions
- Pliable gaskets, impervious to Methyl Chloride, Freon-12, Sulphur Dioxide and Refrigerant Oils

Ask to see the LIQUID EYE
at your jobber

ALLIN MFG. CO.

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year's officers, who are Mr. Glazer, President, Mr. Meyers, Vice President and Mr. Bakke, Secretary-Treasurer.

Neal S. Templin is Executive Secretary of the Association whose headquarters are at 1206 Maple Avenue, Los Angeles and which is composed of the majority of the companies manufacturing refrigerating equipment and refrigerated fixtures in the Los Angeles area.

At the present time the Association is engaged in renegotiating a master labor agreement between its members and the Los Angeles Building and Construction Trades Council and various local unions covering production workers in their plants.

★ ★ ★

REDUCE MOTOR PRICES

PPRICE reductions up to 16 per cent on practically all alternating current induction types of fractional horsepower electric motors manufactured by Redmond Company, Inc., Owosso, Michigan, were announced today by Lewis Hamlin, Executive Vice-President. Reductions average approximately 10 per cent on motors formerly selling in the \$2.50 to \$8.00 price range.

Effective May 1, this is the second price reduction made by the Redmond Company since last December when a 5 per cent cut was announced on these same motors.

★ ★ ★

NERA HOLDS CONFERENCE ON TRADE-IN PROBLEMS

THIRTY-TWO dealers, manufacturers and representatives of cooperating organizations talked man-to-man about the problems confronting dealers in handling used appliances at the National Electrical Retailers Association's Conference on Trade-Ins held at the Merchandise Mart, Chicago, May 6.

F. E. Morrison, Chairman of the NERA Committee on Trade-Ins, and manager of the appliance department of the Rockford Standard Furniture Company, Rockford, Illinois, presided at the round-table conference, as well as the one day conference of dealers which preceded the joint session.

Trade-Ins are rapidly becoming an industry problem, Mr. Morrison stated in opening the conference. He quoted the

results of a NERA survey on trade-ins recently made among NERA members nation-wide which indicated a total of 92.5% of all reporting dealers are now confronted with trade-in problems.

He stated that the purpose of the NERA conference on Trade-Ins was to study trade-in problems and methods of handling used appliances, with a view to publishing the combined recommendations in booklet form to be used as a dealer manual.

Altho the final aim of the conference was to develop recommendations for the dealer trade-in manual, Mr. Morrison pointed out that the dealer committee recognized that some of the problems submitted at the meeting would have to be referred to a sub-committee of dealers and manufacturers for study and report before final action could be taken.

★ ★ ★

ACRMA ELECTS OFFICERS

GEORGE S. JONES, Jr., vice president in charge of sales of Servel, Incorporated, Evansville, Indiana, was elected president of the Air Conditioning and Refrigerating Machinery Association recently at the Association's annual convention at Hot Springs, Virginia.

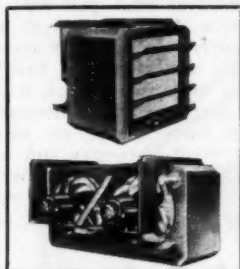
Mr. Jones, who has been vice president of Servel since 1936, has long been associated with the refrigeration and air conditioning industry. Previous to joining Servel in 1933, he was associated with Frigidaire Corporation.

In addition to the election of Mr. Jones as president of ACRMA, the convention named Ross Rathbun, president of the Baker Ice Machine Company of South Windham, Maine, as first vice president; George R. Prout, vice president of the General Electric Company, as second vice president; and P. A. McKittrick, vice president of the Parks-Cramer Company, Fitchburg, Massachusetts, as treasurer.

New members of the Board of Directors of the Association are: W. H. Aubrey, Frick Company, Incorporated; E. A. Bonneville, Fedders-Quigan Corporation; A. J. Bronold, Sturtevant Division, Westinghouse Electric Corporation; G. A. Heuser, Henry Vogt Machine Company; George S. Jones, Jr., Servel, Incorporated; S. E. Lauer, York Corporation; H. F. Lehman, Frigidaire Division, General Motors Corporation; P. A. Mc-

HOWE REFRIGERATION KNOWN THE WORLD OVER

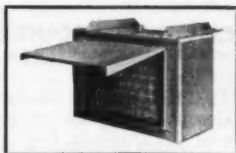
HOWE-CONDITIONAIRE UNIT COOLERS



Ceiling type, for all commercial purposes, these Howe-Conditionaire unit coolers have all-steel welded hot galvanized fin coil suitable for all refrigerants. Coil has permanent 100% fin contact. Heavy gauge steel, sweat-proof, corrosion-free housing; four adjustable deflectors to insure uniform air circulation; generous size motors for long life. Correct design insures high humidity for storage of fresh food products.

HOWE-CONDITIONAIRE Rapid Freeze Cooler

Designed for that low temperature job . . . for continuous heavy duty loads. Cork insulated housings make possible defrosting without rise in room temperature. Use Howe-Conditionaires for efficiency...permanency...safety.



HOWE ICE MACHINE CO.

2825 Montrose Ave., Chicago 18, Illinois • Distributors in Principal Cities

EXCLUSIVE REFRIGERATION EQUIPMENT BUILDERS SINCE 1912

DO YOU CARRY REFRIGERATORS?

Or do you use the
EASLOAD TRUCK?



Easload Appliance Trucks can save as much as 60% in moving costs. They can cut down your trucking time at least 25%. For the Easload is made to balance the entire weight of the load on the wheels.

When you use Easload Trucks, you don't carry refrigerators — you push them on easy-rolling ball bearing rubber tire wheels.

The Easload is handy for getting the load into and out of the truck, for going up and down steps. You can slide the load on the smooth tubular Easload handles. With the double ratchet you can use two straps instead of one. Rubber guards protect the load and other appliances.

Write Today for Free Copy of "Dear Easload"

COLSON EQUIPMENT & SUPPLY CO.

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Kittrick, Parks-Cramer Company; E. T. Murphy, Carrier Corporation; W. C. Newberg, Airtemp Division, Chrysler Corporation; G. R. Prout, General Electric Company; Ross Rathbun, Baker Ice Machine Company, Incorporated; D. Robertson, Universal Cooler Division, International Detrola Corporation; F. C. Schnacke, Schnacke, Incorporated; A. O. Vogel, The Vilter Manufacturing Company; G. E. Wallis, The Creamery Package Manufacturing Company; K. A. Weatherwax, Acme Industries, Incorporated; C. E. Wilson, Worthington Pump and Machinery Corporation.

★ ★ ★

CENTRAL ACQUIRES NEW BRANCH

EFFECTIVE April 15, Central Supply Company became owners and operators of the Budlock Refrigeration Supply Company branch at 1624 South Calhoun Street, Fort Wayne 6, Indiana. While they will maintain the same personnel that has been operating this branch with Charles Hill as manager, it will henceforth be known as Central Supply Company.

★ ★ ★

NEW SALES EVALUATOR

A UNIQUE new sales compensation system, developed by Frigidaire, promises to eliminate much of the "mid-night oil" for commercial refrigeration and air conditioning dealers when it comes to figuring the intricacies of sales cost-control, sales evaluation and salesmen's salaries, commissions and bonuses.

Announced by Ellsworth Gilbert, Sales Promotion manager, the new plan has been designed to aid the dealer in attracting and holding better salesmen through fair and equitable compensation; keep closer tabs on sales costs, and help afford day-by-day control of selling activities.

This compensation plan, which is based upon a percentage of average gross profits, embraces the many variable phases of commercial selling, including sales potential, the salesman's experience, seasonal selling trends, local business conditions, trade-ins, the cost of accessory equipment, installation and others.

Key to the entire system are two ingenious calculating devices known as the Frigidaire Commercial Sales Compensation Selector and the Sales Evaluator. The dealer decides what per cent of gross profit the salesman's earnings are to be and a yearly sales quota is agreed on by the dealer and salesman. Setting the Selector for these two factors, it automatically determines the salesman's weekly salary commissions on sales, quarterly and yearly bonuses and anticipated annual earnings. The Selector also shows what the salesman will earn if he goes over or under his quota, and the amount of dealer-sales cost.

★ ★ ★

NEW COMPRESSOR CONCERN

DENNIS W. DONOHUE recently announced formation of United Motor Industries Corporation for the manufacture and sale of compressors and condensing units for fractional horsepower refrigeration equipment.

Donohue, operating head of this new company, was for many years Executive Vice President and General Manager of Mills Industries, Inc., Chicago. Associated with him in the new concern are George B. Dardwin, as Vice President, formerly Mills Vice President in charge of manufacturing, and Allen Trask, as Refrigeration Engineer.

United Motor Industries Corporation have opened offices at 33 North LaSalle Street, Chicago, and 120 Wall Street, New York, and are already in production in their factory at 2300 North Stiles Street, Linden, New Jersey. Chief products are $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 horsepower direct drive compressors and condensing units.

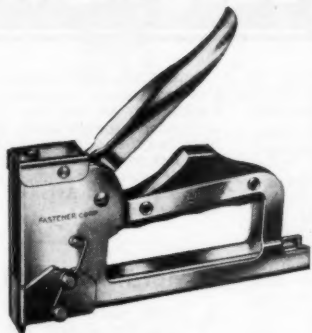
★ ★ ★

LOS ANGELES ASRE MEETING

THE Los Angeles chapter of the American Society of Refrigerating Engineers held its June 21st meeting at the Rodger Young Auditorium in Los Angeles. Dinner preceded the meeting.

Principal speaker for the evening was Dan Wile of Refrigerating Engineering, Inc., on the subject "Modern Engineering Attacks the Evaporative Condenser Problem." His talk covered the basic principles of operation and recent improvements made to eliminate trouble in evaporative condensers.

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Tacks Fast And Sure



**IT'S THE NEW DUO-FAST
GASKET TACKER**
with the Extended Lip

- For tacking hard rubber gaskets and tacking over beadings.
- One hand operates tacker with speed and accuracy—the other hand is free to hold work.
- Drives medium or heavy gauge staples in $\frac{1}{4}$ ", $\frac{5}{16}$ " or $\frac{3}{8}$ " lengths.

EQUIPPED WITH THE NEW
Jiffy Jaw

The DUO-FAST Jiffy Jaw is something special—it takes just a second to relieve a jammed condition—Click it's off—Click it's on—no delay and on with your production.

*Call Your DUO-FAST
Specialist*

Your DUO-FAST Specialist is a good man to know—he may have ideas to speed up your production and cut your costs—Write for the name of the man in your territory.

FASTENER CORPORATION
846 Fletcher St. Chicago, Illinois

**MAKE YOUR FUTURE
SECURE...**
**IN AIR CONDITIONING
AND REFRIGERATION!**

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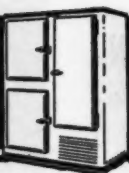
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NEW AND IMPROVED EQUIPMENT



Information in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

Beer Cooler

OUT of production since before the war, three newly designed heavy duty draught beer coolers have been added to a line manufactured by Temprite Products Corporation, 47 Piquette Avenue, Detroit, Michigan.

Capable of dispensing 40 degree beer during continuous peak load demands, these new models will draw either 1 or 2 different brands of beer plus cooled plain water



and soda water and are intended for use where beer kegs are located in a warm area and where no precooler is provided. These heavy duty coolers are also ideal for use where long periods of heavy or continuous draught are encountered even though a precooler is used or where precooler size is relatively small. The four medium-capacity models which complete the line will draw up to 3 different brands of beer plus plain and soda water and are intended to be used where beer kegs are stored

in a precooler or cool location and where the draught or load is relatively light. Selection table and information is available from manufacturer. All models are equipped with oval shaped stainless steel beer coils, specially designed to control both the rate of beer flow through the coil and the rate of cooling so that beer is dispensed from the faucet at the proper drinking temperature and with the correct percentage of head or collar.

Power Element

A COMPLETELY new beryllium copper power element featuring greater sensitivity and positive action, has been announced by Ranco Inc., world's largest manufacturers of refrigeration controls. The new element, designed and developed by Ranco engineers for use on all Ranco controls, marks still another refrigeration development credited to the Ranco organization.



Production of the beryllium copper power element is handled entirely in the modern Ranco plant, where complete control of materials, assembly and testing insures precision craftsmanship. The unit has been thoroughly tested in thousands of installations in precision instruments manufactured during wartime by Ranco and in over 2,000,000 refrigeration controls.

Complete information on the new power unit and its application to various types of Ranco refrigeration controls may be obtained from any Ranco wholesaler or by writing direct to Ranco Inc., 601 West Fifth Avenue, Columbus 1, Ohio.

Metal Lacquer

A NEW metal lacquer has been developed by the Dennis Chemical Co., 2701 Papin St., St. Louis, Mo. for use where oil resistance, toughness and maximum adhesion are required. Dennis No. 5062 lacquer will withstand 24-hour immersion in gasoline and 15-minute immersion in hot oil (275 F.) with no apparent deterioration in film strength or gloss. This coating has excellent adhesion to a variety of metal surfaces and has found particular application over "Cronak" treated metals. A complete line of colors is available. Full information upon request.

Pliers

H. R. BASFORD COMPANY, San Francisco, announces that a new kind of vise pliers called "Gripsos", with an exclusive new type of finger tip release, new jaw



construction and double action adjusting screw is now being distributed nationally through a limited number of wholesalers. The new features are said to make it possible to quickly adjust the tool for ratchet or plier action, to lock and release all with one hand, making it easily adaptable for use as a pliers, hand vise, nut wrench,

FOR ECONOMICAL OPERATION



on your next job choose a

MILLS

a condensing unit for
every installation

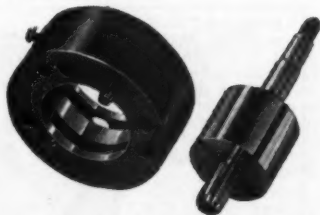
Mills Industries, Incorporated • 4100 Fullerton Avenue • Chicago 39, Illinois

IF YOU WANT TO BE SURE YOUR PARTS ARE
RIGHT FOR THE NEXT COLDSPOT JOB —

Ask Your Wholesaler for

RIXCO REPLACEMENT PARTS FOR COLDSPOT UNITS

Rixco Replacement Parts are high-quality parts, engineered to factory standards of accuracy, and guaranteed 100%. Furthermore, careful testing of all parts from basic material to finished product is additional assurance that jobs serviced with Rixco Parts will deliver longer, more dependable service. So if you want to be sure your parts are right for the next Coldspot job, ask your wholesaler for Rixco Replacement Parts, or write direct giving name of your regular supplier.



REBUILT ROTOR BLOCK ASSEMBLIES

1/6-1/5-1/4 H.P. Large stock, precision ground and matched sets to fit all Coldspot compressors having 15/32" shafts. For immediate exchange or outright purchase.

Blocks are equipped with new oil hole screw and	
Exch.	
Price, Each	\$10.50
Outright, sets are tested	
Price, Each	\$14.25
under actual operation.	



No. 150—REPLACEMENT CHECK VALVES

1 to 9 each	\$2.45
10 or more ea.	\$2.25



This Rixco Check Valve consists of a cage, ball, disc, and Neoprene gasket. It saves time and labor . . . eliminates grinding or lapping of the old seat. Every Check Valve is factory-tested. No installation tool required.



CARBON VANES

These Vanes are quiet, easy to lap, save time for the serviceman. Carbon Vanes are standard equipment on all late model Coldspots. \$1.25 set of 4. Specify size required.

We also have available Motor Drive Couplings, Flexible Couplings, Fans, Oil Cooling Coils, Hermetic Discharge Valve Reeds, Main Compressor Bearings, and Bearing Tools.

RIXCO DISTRIBUTING CO.

7330 Lindell

St. Louis 5, Mo.

SERVICE ENGINEER

107

June, 1948

pipe wrench or clamp and especially useful in hard-to-get-at-places.

It is said to have gripping range from light pressure to over a ton and the new finger tip release, which enables the user to unlock the pliers from any position with one finger, was designed to save time, save knuckles from being bruised by handles leaping apart, and place complete control of the tool in one hand.

Jig Saw

A JIG SAW attachment which is mounted on a drill press opens up an entirely new method of jig sawing wood, plastic, light metals, and leather. This inexpensive precision unit was recently announced by the LaMonte Manufacturing Company, Bellflower, California.

The LaMonte Jig Saw attachment obtains double duty from a drill press whether in factory or home workshop. No additional motor or space required for conventional jig



saw. Ball bearings and Oillite are used to insure long life and smooth operation. All moving parts are packed in grease, hermetically sealed to provide lubrication for life, and keep out dirt. This attractive unit is completely rust-proofed and polished to a mirror finish.

The LaMonte Jig Saw will

cut in any direction with no limitation as the blade can be mounted in all four positions. Having no belts or pulleys, full safety is assured. The simple three minute installation consists of gripping the power unit in the chuck, and fastening the work table to drill press with C clamps. Ordinary jig saw blades which can be obtained in all hardware and novelty stores, are used. The LaMonte Jig Saw retails for \$14.95, and is shipped complete with saw blade ready for use.

Dehydrator

THE new Cee-Kleer drier offers a simplified, economical method for installing a drier, filter and sight glass in one compact unit in a refrigeration system. It is designed to assure free, full flow of the refrigerant and provides easier, faster service. Equipped with either 1/4" flare to 1/4" pipe, or 3/8" flare to 1/4" pipe connections, the drier is constructed with



all brass fittings and copper case. Both screwed and soldered joints are used. It is filled with 10 to 20 granular, screened Silica-Gel and has an effective area of over 10 cubic inches.

Pressure drop is at a minimum and the sight glass portion of the device is of the non-etching, stain proof type. 8 1/2" square inches of 100 mesh screen provides effective filtering surface. In addition is a 3/64" felt sack of high quality covering the filtering screen.

The device is being merchandised through the B. & W. Sales Company, Cincinnati, Ohio.

Thermometer

A VERSATILE new low priced dial thermometer manufactured in watch-like pocket size has been announced by Jas. P. Marsh Corporation, Dept. 5-P, Skokie, Illinois.

In addition to convenient size, the new pocket thermometer offers the easy-reading feature of a dial type thermometer. It can be placed at any convenient point within the freezing compartment and when the temperature has registered, will plainly show the exact temperature on the clearly marked dial that is legible even in poor light.

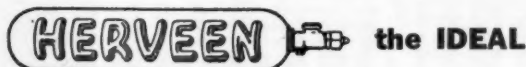
The instrument measures only 2 - 3/16" in diameter and is produced in a handsome, polished case of durable, heavy-gauge stainless steel. An ingenious spring clip mounted on a swivel serves to hold the thermometer in



the pocket when not in use, or serves as a hanger when taking temperature. Protection against rough handling is assured by an unbreakable crystal. Should it ever be knocked out of adjustment, the Marsh "Recalibrator Slide" on the back makes correction simple; merely set it to coincide with a thermometer of known accuracy.

HERVEEN the Replacement Refrigerant

Service men—Herveen is the IDEAL REPLACEMENT GAS for Meter-Misers. When your Frigidaire Meter-Miser customers need service on their unit, don't turn them down with the statement "the refrigerant is not available." We can deliver



REPLACEMENT REFRIGERANT

Many service companies are using this refrigerant for charging Meter-Misers in their localities.

- ★ Meter-Miser calls are routine with a supply of HERVEEN.
- ★ Installing HERVEEN does not involve more than average care.

For deliveries, see your local jobber or write to

Conservative Gas Corporation, Modern Gas Division
MANUFACTURERS AND REFINERS
1084 Bedford Ave. Brooklyn 5, New York

recommended
for
painted or
enameled
surfaces...

Jarrow...

Refrigerator Door Gaskets
Are Again Made From
Crude Rubber

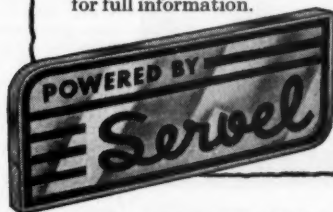
Always Demand These
Quality Gaskets



SERVICE ENGINEER

*Electrical system
easy to check...*

—and quick to adjust in the Servel Supermetic condensing unit. That's why you save your service and installation department valuable time when you sell Servel. Call your local Servel distributor for full information.



Electric Refrigeration Division
SERVEL, INC.
EVANSVILLE 20, INDIANA

Analyzer

WITH a refurbished case, light weight, but giving thoroughly accurate results, the Hermetic Unit analyzer, introduced some time ago under the trade name "Annie", is meeting with the approval of service men who wish to save time and quickly locate various common but elusive and annoying problems. "Annie" makes estimates without fear of loss a reality; makes it unnecessary to "guess". Annie reverses direction of run, provides manual starting, indicates open or grounded fields, releases stuck or frozen units. Since it weighs only 1½ lbs. Annie is a real boon to the service man who has to travel far and who wishes to cut down his equipment to a minimum. Annie can be had from wholesalers or direct from the manufacturers, Mechanical Enterprises 4856 Lanekershim Blvd., North Hollywood, Calif.

Dehumidifier

DESIGNED to reduce humidity in basements, libraries, game rooms, and in light commercial applica-



tions, a new dehumidifier utilizing a refrigeration principle for the condensation of air moisture has been developed by the Frigidaire Divi-

sion, General Motors Corporation.

The circular unit is equipped with a fan that draws the moist air over a series of coils, removing the moisture and condensing it into drops of water that are deposited in a container or drain.

As a result of this drying action, more positive protection is afforded articles stored in the closed area where the dehumidifier is located. It reduces mold formation on stored clothes, luggage and other fabric or leather items, reduces rust and corrosion of metal objects, such as tools and furnaces, reduces warping of furniture and woodwork; and reduces the sweating and clammy feel of basement walls.

Measuring only 33½ inches high and 14 inches in diameter, the dehumidifier may be placed in any room with an electrical outlet and plugged in for immediate operation. No floor bolting or other special connections are required for its continuous operation. Price \$149.75.

Water Cooler

A BRAND new idea in bottle-type, compartment, electric water coolers that eliminates the need for tricky or troublesome valves to maintain different degrees of cold for simultaneous water-cooling, cold storage, and ice cube freezing is being introduced by The Ebco Manufacturing Company, Columbus, in its Model OBR Oasis compartment bottle-type cooler.

This unusual method of refrigeration and reliable and steady temperature controls for three simultaneous gradations of cold is the result of over two years of intensive research, testing, and proving. The results are achieved with capillary tube control. The chief advantages are the fully automatic operation and the absence of the necessity of any tricky valve adjustments.

The triple-duty OBR Oasis cooler is being made principally to satisfy public demands for a modern sanitary piece of equipment that will simultaneously supply a generous amount of properly cooled water, provide cold storage space, and freeze ice cubes.

The Ebco President said the



new OBR Oasis provides properly cooled water for 16 to 20 persons while it freezes at the same time 28 large ice cubes, and supplies an ample cold storage space for beverages, fresh fruits, lunches, and other material. Tall, 32-ounce, gingerale or soda bottles, or quart milk bottles can easily be placed upright in the compartment storage space.

Weld Flange

PRESSTITE Engineering Company, St. Louis, manufacturers of sealing compounds for industry, have developed a new method for sealing vertical or horizontal spot-welded flange joints in refrigerator cabinets or any spot-welded flange joints requiring sealing against air, moisture, dust, etc.



This new method uses Presstite Permugum placed into an extruded plastic channel, providing a fool-proof positive seal easily and quickly.

Presstite Permugum Plastic Channel can be furnished in random or cut lengths as required. When used on exterior flange joints, the Plastic Channel provides an attractive exterior trim.

The Refrigeration Contractor's ESTIMATING GUIDE

by DONALD F. DALY

A New Book

on a mighty important subject

THE author presents in this book the results of not only his own experience, covering many years of refrigeration estimating, but the knowledge of other substantial refrigeration contractors who have learned the "hard way." The purpose of this book is to bring to you, in concise form, this wealth of experience.

Remember there is no magic formulae or short cuts for estimating refrigeration installations but there are plenty of pitfalls that the experienced and inexperienced estimator can avoid.

This book points out, step by step, the approach to the problem confronting every individual and organization engaged in the business. It presents in readable form and understandable language, information that oftentimes means the difference between profit and loss.

The principal subjects include discussions on:

ESTIMATING INSTALLATION COSTS
ESTIMATING REBUILD OR OVERHAUL JOBS
CONTRACTING FOR DEALER SERVICE
REBUILDING PACKAGED UNITS ON CONTRACT
COMMERCIAL MONTHLY INSPECTION CONTRACTS
COMMERCIAL MONTHLY LABOR AND MATERIAL CONTRACTS
SERVICING EQUIPMENT FOR LOW COST OPERATION
WARRANTY SERVICE
REFERENCE TABLES

This book is principally a compilation of articles appearing in past issues of The Refrigeration Service Engineer

138 pages—6 x 8½ inches—\$2.00 postpaid

NICKERSON & COLLINS CO., Publishers

433 N. Wacker Ave., Chicago 44

THE REFRIGERATION SERVICE ENGINEER
REFERENCE MANUAL NO. 4

2⁰⁰

Tester

A NEW low cost Appliance Tester has been announced by the Tester Sales Co. of Akron, Ohio.

It is a small and compact instrument that has many uses but features hermetic



analyzing. The tester has been thoroughly field tested and the servicemen will find it a reliable tool. Sold through Wholesalers, the instrument is priced at \$7.50 complete with instructions and a container that will withstand much abuse.

Timer

A PORTABLE all - electric timer for automatically shutting off window and other portable fans after any pre-selected time has just been announced by Paragon Electric Company, Two Rivers, Wisconsin.



Known as the "Portable AF" it is a companion to the Paragon line of Manually Preset AF Series Timers for permanent attic fan installations. Except for the portable feature, the new timer is identical in construction and appearance. Housed in a compact anodized aluminum case, the Portable AF is available in two time ranges, 0 to 10 and 0 to 20 hours.

Easy-to-use, the timer cord is plugged into any convenient outlet; the fan cord, in turn, is plugged into the receptacle at the bottom of the case. Key hole slots are provided at the back for convenient mounting. Rubber pads prevent marring of wall and window surfaces, or furniture if timer is operated on its back. Rated at 10 amps., $\frac{1}{2}$ horsepower, 115 volts AC., the Portable AF can be used with any make of window fan. It offers jobbers and dealers the sales advantages of a product that adds convenience of operation and operating economy to the comfort of cooling fans.

For more information, write Paragon Electric Company, 1201 Adams Street, Two Rivers, Wisconsin.

Dehumidifier

PRODUCTION of a new, low-cost dehumidifier, capable of removing 34 pints of water a day from the atmosphere of a normal sized room in a humid climate, is an-



nounced by Carrier Corporation, manufacturer of air conditioning and refrigeration equipment.

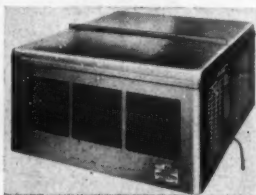
The compact unit, known as the Carrier Humidry, operates inexpensively on a one-third horsepower motor.

It is particularly applicable to homes in warm climates which are closed for all or part of the summer and where furnishings and decorations suffer from mold or mildew. It can be used in all climates for basement playrooms and other areas where dampness and humidity cause deterioration and discomfort. Other uses will be to prevent rust on valuable tools and to preserve permanent records in vaults against mold.

The Humidry can be plugged into an ordinary electrical outlet with only a connection for running moisture down a drain.

Room Cooler

A NEW window-type room air conditioner, equipped with two separate refrigerating systems for "selective cooling" of the home or office, has been developed by Frigidaire Division of General Motors, according to an announcement by W. F.



Switzer, Commercial Sales manager. A smaller unit of similar design, but with a single refrigerating system, is already on the market.

The dual refrigerating systems, operated by two hermetically - sealed, self - oiling Meter - Miser compressors, provide more than three-fourths of a ton refrigerating capacity. Because they can be operated together or separately, according to the dictates of outside temperatures, the cooling operation is more economical. One of the refrigerating systems supplies adequate capacity to cool a room during the night and temperate summer weather. During extremely hot days both systems can be operated simultaneously.

Although the unit is only 28 $\frac{1}{4}$ inches wide, 32 $\frac{1}{4}$ inches deep and 14 $\frac{1}{4}$ inches high, rooms up to 500 square feet in size can be air conditioned. The unit filters, dehumidifies, cools and circulates air at the rate of 325 cubic feet per minute. Fresh outside air for ventilation can be added at a rate of up to 50 cubic feet per minute.

Lok-Tite

THE Lok-Tite plug and wall plate unit, constructed to maintain tight connections for all electrical outlets in industrial shops and plants, has recently been developed by the Lok-Tite Manufacturing Company, Denver, Colorado. Designed to prevent disconnection on all types of



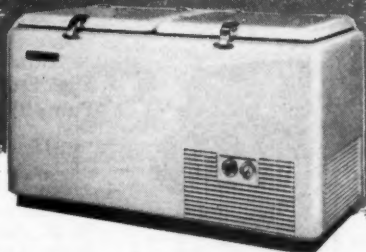
Spring Broilers



Summer Gardens



High Food Costs



Help sell **BEN-HUR** Farm & Home Freezers

Many Prospective Freezer Owners are "window shopping" now—planning to freeze and store those tender "springers" for tasty broiling next winter . . . or anticipating storage facilities for fresh garden produce, a "porker" or two, a prize steer. Or, they're anticipating licking the high cost of food by quantity purchases when these foods are plentiful and at lowest prices this summer.

BEN-HUR FARM-HOME FREEZERS

Cash in on this active demand by displaying the complete BEN-HUR Line in YOUR store—FOUR popular models, in 6, 9, 12.5 and 18 cu. ft. sizes to fit every family's needs. And selling is made easier with BEN-HUR's National Advertising, complete sales helps—displays, direct mail, ad mats and other extras.

COMPARE THEM ALL . . . And You'll Choose The BEN-HUR Line.

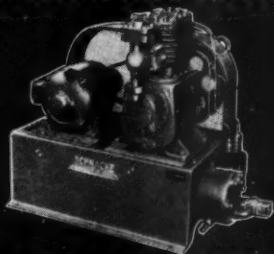
A few choice territories still open. Write

BEN-HUR MFG. CO.

Dept. RS, 634 E. Keefe Ave. Milwaukee 12, Wis.

HEALTHFUL LIVING THROUGH FROZEN FOODS

SCHNACKE
COMPRESSORS
and *Complete*
CONDENSING UNITS



THE INDUSTRY'S MOST
Easily SERVICED UNITS

For detailed Service
and Engineering data, write

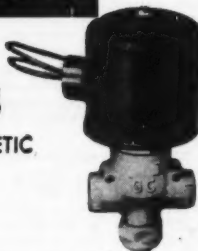
SCHNACKE, INC.

1024 Columbia Street EVANSVILLE, IND.

For
Efficient
Refrigeration

New

K-20-5
ELECTRO-MAGNETIC
VALVE



For complete specifications on Automatic Pressure, Temperature and Flow Controls, request new Catalog 52C.

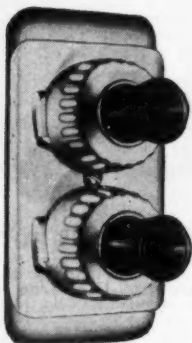
GENERAL CONTROLS

801 ALLEN AVENUE CHICAGO, ILL.

FACTORY BRANCHES: PHILADELPHIA • ATLANTA
BOSTON • CHICAGO • KANSAS CITY • NEW YORK
DALLAS • DENVER • DETROIT • CLEVELAND • HOUSTON
SAN FRANCISCO • SEATTLE • PITTSBURGH

DISTRIBUTORS IN PRINCIPAL CITIES

electrical equipment, the plug will not pull from the outlet, and a tight, safe connection is assured.



The plug itself, of durable hard rubber, is attached inside a metal holder. Projecting ears on the holder engage under specially formed receiver prongs on the wall plate and only a quarter turn will lock the connection.

Thermometers

PRECISION Thermometer & Instrument Company announces production of a Kata-thermometer outfit for convenient, accurate measurement of air velocities in the range between 10 feet and 600 feet per minute. The complete unit, with convenient pocket size case, consists of a Princo Kata-thermometer, a test thermometer and a Kata Reference Chart from which the air velocity is determined.

The Kata-thermometer is an all-glass, etched stem thermometer about 10" long, with a spirit filled cylindrical bulb with a large surface area. It is the cooling action of moving air upon the sensitive bulb that constitutes the functional principle of the instrument.

The advantage of the Kata-thermometer method over other air measuring devices is its accuracy at the relatively low velocities as noted. Also, indication of velocity is independent of the direction of the air stream, even if that direction is changing rapidly.

TRADE LITERATURE

Egg Freezing Pamphlet

THE practical aspects of freezing eggs for storage are discussed by the well known authority, Dr. M. E. Pennington, in the latest Application Data Section (Ad 29-R) to be published by The American Society of Refrigerating Engineers.

The eight-page brochure contains information on raw material standards, sanitary control, control of composition, general manufacturing conditions, freezing of liquid eggs, holding freezer, and transportation.

The author was a pioneer in the handling of perishable products under refrigeration and is now a consultant on food problems.

Copies may be obtained from ASRE headquarters, 40 West 40th Street, New York 18, N. Y., for 35c each.

★ ★ ★

Acme Blo-Cold Catalog

THE new "Blo-Cold" Catalog No. 932, which is being widely distributed is attracting a great deal of interest among buyers of this type of equipment. Comments on the new series from all sections of the U. S. are highly favorable.

The new models of Blo-Cold Industrial Unit Coolers recently announced by Acme Industries, Inc.,

have met with quick widespread approval by the refrigeration and air conditioning industry.

Consisting of sixteen pages in two colors the new catalog contains illustrations, and dimension diagrams of the various models, mechanical specifications, capacity ratings and additional engineering information.

Of special interest is the section devoted to the selection method with examples, which makes it easy for the Refrigeration Engineer to select that type of unit which best fits any particular application.

"Blo-Cold" Series B and C are dry coil units specifically designed for cold storage applications, using finned coils with models for both Freon and ammonia.

Series CBS are designed for low temperature applications requiring continuous brine spray to keep coils free from frost and are available for use with either Freon 12 or ammonia.

Series H and HBS are prime surface units specifically designed for flooded ammonia operation.

CFM ratings range from 2070 to 11900 with one, two, or three fans.

★ ★ ★

New Book

A NEW book, "The Refrigeration Contractor's Estimating Guide" published by Nickerson & Collins Co., is just off the press.

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PERSONNEL NOTES

Youth Has Its Day At Virginia

TWO young men have been appointed to key posts, one in sales and the other in manufacturing, by the Virginia Smelting Company, West Norfolk, Va., one of the country's foremost producers of industrial chemicals.



W. F. LUCKENBACH JR.

They are W. F. Luckenbach, Jr., who becomes manager of industrial sales, and Dr. Daniel W. Duncan, who is named



DR. D. W. DUNCAN

head of the company's chemical engineering process improvement section.

Luckenbach is 35 and Duncan 32.

The appointments were in line with a company "youth policy", said A. K. Scribner, general manager. The company, which marks its 50th anniversary this year, makes a practice, he said, of hiring able young college graduates and moving them up fast as well as of bringing in experienced young men of demonstrated ability and placing them immediately in responsible jobs.

Luckenbach came to the Virginia Smelting Company from the Foote Mineral Company, Inc., of Philadelphia, where, during more than six years, he moved from sales engineer to director of research and, by choice, back to sales engineer again.

Virginia Smelting's second young appointee, Dr. Duncan, was born in Russellville, Alabama. He heads a department which has eight men now and is expanding. He is seeking to improve quality and yield of the company's products and reduce the cost of production.

★ ★ ★

Remco Appoints Stevens

K. M. NEWCUM, President of Remco, Inc., announces the appointment of O. E. (Steve) Stevens as their representative in the Southeastern States including Virginia, North Carolina, South Carolina, Georgia,

Florida, and Eastern Tennessee.

For the past nine years Mr. Stevens has been a direct factory representative of the Dayton Rubber Company.

His headquarters will be at 300 Keswick Avenue, Charlotte 6, North Carolina.

★ ★ ★

Sporlan Valve Appointments

THE Sporlan Valve Company of St. Louis, Missouri, announces the opening of two additional



M. G. HAYNES

sales offices. One in San Francisco, California, the other in Atlanta, Georgia. Merle G. Haynes for many



D. M. LAWSON

years associated with the refrigeration industry on the West Coast will be in charge of the San Fran-

RECORDING INSTRUMENTS of Air Temperature and Motor Operation

These instruments take the guesswork out of trouble-shooting on any type of refrigeration equipment. With them you can automatically chart a written record of the true performance of the equipment you are servicing in the home, store, or cold storage plant. Such charts, taken before and after the job, are good proof of work well done.

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cisco office located at 1334 Potrero Avenue. He will cover an eight state territory, including Arizona, California, Idaho, Nevada, Oregon, Utah, Washington, and a portion of Montana.

David M. Lawson will handle the Southeastern territory with headquarters at 735 Spring Street Northwest, Atlanta, Georgia. His territory comprises the states of Alabama, Florida, Georgia, Mississippi, North and South Carolina, Tennessee and a portion of Louisiana.

★ ★ ★

W. Smallwood Of Toronto

JOHN V. TURNER, President of Perrin-Turner Limited, Toronto, Canada, announced that effective June 1st., 1948, Walter Smallwood became Vice-President and General Sales Manager of the Company.

Mr. Smallwood has had wide experience in both the electrical and refrigeration fields having been connected successively with Southern California Edison Company in Los Angeles, Niagara and Hudson Power Corporation, Frigidaire, Norge and for the past twelve years at the Canadian General Electric Company's Head Office in Toronto where he was Manager of the Air Conditioning Division of that Company.

In addition to being a successful sales engineer and service manager, Mr. Smallwood for eight years taught refrigeration, heating and air conditioning for the Toronto Board of Education night extension

courses. Mr. Smallwood is a member of the A.S.R.E., and R.S.E.S.: a director on the Provincial Apprenticeship Act Board, and of the Canadian Refrigeration Manufacturers Association, as well as a director of the Canadian Oil Heating Association.

In his new position he is charged with the responsibility of setting up a national dealer organization for the distribution of Servel-Schnacke commercial condensing units and allied products.

★ ★ ★

Honeywell Promotes Five

A NUMBER of personnel changes including new regional, branch and division managerships have been announced by the Minneapolis-Honeywell Regulator Company. According to Thomas McDonald, vice president, the moves were made necessary because of expanding sales and service activities in various sections of the country affecting several of the company's divisions.

G. M. Kingsland, who has been heading sales activities of the company's control devices and specialties departments, is taking over new duties in the heating controls division. His immediate responsibility will be to head up sales activities of the stoker controls division. Kingsland joined Honeywell in 1934 and has worked in various sales capacities in Omaha, Dallas, Philadelphia, Denver, and Cleveland, having been brought back to head the specialties division in 1945.

Walter J. Baak, who has been Moduflow sales manager of the midwestern region, with headquarters in Chicago, has been promoted to sales manager of the wholesale division.

Other personnel changes include the promotion of Kent L. Wilson as manager of the southwest region with headquarters in Dallas. Succeeding Wilson in Detroit is T. S. Carley who has been sales manager of the stoker and wholesale divisions at the home office.

William S. Robards has been appointed Milwaukee branch manager. He succeeds L. C. Johnson who died after a short illness in May of this year.

★ ★ ★

Gavigan For Wilson

APPOINTMENT of James J. Gavigan, 118 East 27th Street, New York City, as factory representative for Wilson Refrigeration, Inc., Smyrna, Delaware has been announced.

Mr. Gavigan's sales territory will include all of metropolitan New York, Long Island, and Westchester County.

Mr. Gavigan, President of James J. Gavigan & Co., Inc., has been identified with the refrigeration field for many years. He joined the Russ Manufacturing Co., Cleveland, Ohio in 1923 rising to the position of General Manager of the Russ National Chain Stores, Inc.. In 1942 Mr. Gavigan was appointed the New York Distributor for Bastian-Blessing, manufacturers of soda fountain, and restaurant equipment.

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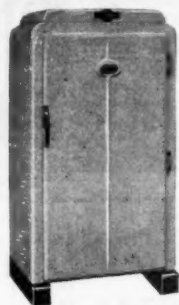
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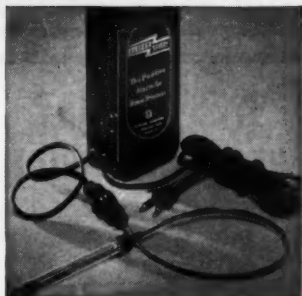
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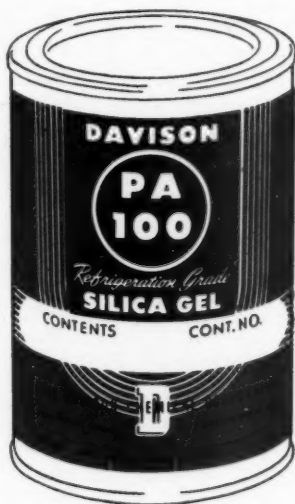
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